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G0058

Emprise Trust
1925 El Camino De La Luz
Santa Barbara, California 93110

SUBJECT: Hydrology Report
Proposed Residential Reuse and Conservation/Restoration Project
1925 El Camino De La Luz
Santa Barbara, California 93109
APN 045-100-24

Cotton, Shires and Associates, Inc. (CSA) is pleased to provide the Emprise Trust, owner of the 0.46-acre (20,046 ft²) parcel at 1925 El Camino De La Luz (ECDLL), Santa Barbara, California, with the following Hydrology Report in support of its application for the proposed single family residential reuse and conservation/restoration development project for the subject parcel (ABDS, Inc, Site Plan, March 11, 2015, and C. L. Grant, Civil Engineer, Grading and Drainage/Erosion Control Plans, March 28, 2014, and others). The parcel fronts on the Santa Barbara Channel of the Pacific Ocean, extends between its Mean High Tide Line (MHTL) and the southern right-of-way of ECDLL, and is located within the California coastal zone. In the coastal zone, the storm water management standards of the California Coastal Commission (CCC) apply in addition to those of the City of Santa Barbara (City). This Report, in conjunction with the conformed project site, drainage, and erosion control plans, will constitute the "Drainage and Runoff Control Plan" for California coastal management program purposes.

This Hydrology Report consists of the following parts: Section 1 contains an executive summary of our analysis and findings; Section 2 contains an introduction of our analysis and a description of the subject parcel's hydrologic subareas as well as the applicable storm water management criteria; Section 3 contains a description of the purpose and scope of our analysis; Section 4 contains a discussion of our methodology in conducting the analyses; Section 5 contains a characterization of the hydrologic conditions of the long-developed parcel (a) prior to the 1978 ECDLL landslide and (b) currently (2014-2015); Section 6 contains a description of the proposed post-residential reuse construction completion drainage areas (Sub-catchments [SC's]) and site hydrology design, source control, and treatment best management practices (BMP's) of the proposed comprehensive Storm Water Management System (SWMS); Section 7 contains our quantitative hydrological analysis of drainage conditions during the range of City design storm events, including the pre-landslide, current, and post-project condition periods; and Section 8 contains our statement of the limitations of our analysis

and this Hydrology Report. Figures 1, 2 and 3 (immediately following the text of this report) illustrate our Post-Project Construction Drainage Map (Figure 1), our Pre-Landside Drainage Map (Figure 2) and our Current (2014/2015) Conditions Drainage Map (Figure 3). Appendices A through H (listed in the attachments at the back of this report) contain the technical attachments referenced in this Hydrology Report.

1. EXECUTIVE SUMMARY

Based on our quantitative hydrologic analysis of impervious and other surfaces associated with the developed parcel [under pre-1978 landslide and current (2014-2015) conditions] and the proposed residential reuse, conservation, and restoration project, we recommend a suite of feasible structural and operational best management practices (BMPs) for incorporation in the project that will:

- Continue through re-pavement of the existing driveway, and widening/addition of new driveway segments to prevent discharge of water in the ECDLL municipal storm drain to the parcel;
- Conserve, and restore as applicable, more than half of the parcel (13,450 sf, or 67%) for proposed open space, with colonized and/or horticultural native vegetation and without anthropogenic impervious surfaces;
- During City design storm events, reduce runoff from the proposed structural development envelope through interception and retention (detention, with filtration/treatment) to zero, to avoid water waste and provide non-potable water for reuse on-site, potentially by City public agencies, and to sustain horticultural lemonade berry shrubs on the parcel;
- Reduce runoff volumes from the existing joint 1925-1927 ECDLL driveway and adjacent side yard on the parcel, and enhance storm water runoff from all impervious surfaces proposed for the Project through filtration and maintenance BMPs;
- Improve and maintain the quality of water retained (detained) in the proposed three on-site storage tanks through energy efficient Ultra Violet Light (UVL) treatment, or a similar process;
- Intercept ground water by horizontal drains beneath the structural residential reuse development envelope to reduce the potential for recurrence of high pore water pressures that activated the 1978 landslide, and utilize the water, consistent with its quality, for beneficial (non-potable) reuse;

- Utilize storm water runoff from the restored lower side yards and lower private open space area to support establishment and sustainability of the proposed horticultural lemonade berry mitigation area;
- Utilize excess storm water runoff to the design capacity of the proposed three water storage tanks (with >36,000 gallon capacity) in order of priority (1) to support continued sustainability of the contiguous lemonade berry shrubs on the parcel, (2) for potential beneficial reuse by the City, and (3) for regulated (post-peak hydrograph) discharge (at ≤ 25 gpm/tank) to the ECDLL municipal storm drain; and
- Implement a SWMS maintenance, monitoring/reporting, and adaptive management program to maintain and enhance continued optimum BMP functionality during the 75-year regulatory life of the project such that it (1) reduces the discharge of storm water runoff from the parcel during the maximum City design rainfall event from 5,328 cf/day under current (2014/2015) conditions, and 7,038 cf/day under pre-1978 landslide conditions, to 2,994 cf/day, and (2) reduces storm water runoff from the structural development envelope on the parcel from 1,904 cf/day under current drainage conditions and from 3,391 cf/day under pre-1978 landslide conditions, to zero.

2. INTRODUCTION, DRAINAGE DESCRIPTION AND DESIGN CRITERIA

In this Hydrology Report, we summarize our hydrology analysis of the parcel and proposed residential reuse and conservation/restoration project (Project) at 1925 El Camino De La Luz (ECDDL), Santa Barbara. We have performed the analysis pursuant to the City's Storm Water BMP Guidance Manual (City Manual), applicable City Municipal Code standards, and other criteria contained in the adopted City General Plan, CCC-certified Local Coastal Program (LCP), and guiding CCC storm water regulatory development decisions.

We note at the outset that the proposed residential reuse development envelope (sub-catchments 6, 7, 8, 11, 12, 13, 14, and 15, shown in Figure 1, our Post-Proposed Project Completion Drainage Map) is located substantially within previously (1946-1978) graded, hydro-modified, and/or structurally developed parts of the parcel (see Figure 2).¹ The proposed impervious surface area of the 3-bedroom, 2-garage replacement house roof (1,942 ft²) and the lower patio (77 ft²), for a total of 2,019 ft², are less than the

¹ To meet City Municipal Code driveway and turnaround development standards, ± 275 ft² of the proposed driveway are located on the proposed 4- to 5-foot wide easement on previously graded, hydro-modified, and otherwise developed westerly 1921 ECDLL

roof and lower patio area (2,088 ft²) of the previous house (1956-1978) on the parcel.² However, in order to meet current driveway and turnaround development standards, the Project requires a total impervious surface area of 7,107 ft², compared to 6,632 ft² in the previous (1956-1978) development, which was built to lower driveway/turnaround standards. The Project has also been designed to retain, and restore as applicable, some two-thirds of the parcel as open space, without anthropogenic impervious surfaces (ABDS, March, 2015).

Consistent with the recommendations contained in our "Preliminary Geologic and Geotechnical Report, 1925 ECDLL, Santa Barbara" (2012) to avoid a recurrence of the anthropogenic high pore water pressures in the oxidized Monterey Formation that contributed to the activation of the 1978 ECDLL landslide, we recommend in this Hydrology Report (1) the interception of in-situ groundwater below the residential reuse development envelope, inclusive of the side yards, (2) continued positive control of all overland (sheet) flow from the ECDLL right-of-way, as well as from impervious surfaces by the Project, and (3) maximum practical retention of intercepted water for on-site (and potentially for municipal) beneficial reuse, consistent with landform stability and conservation of native vegetation.³ To conserve the coastal bluff on the parcel against future accelerated erosion or failure as a result of saturation from up-gradient sources of water, CSA recommends that (a) recent trespass use of the coastal bluff to access a transient encampment in the contiguous lemonade berry be stopped, and (b) no concentrated discharge of water occur to the upper termination (edge), face, or base of the coastal bluff on the parcel.

We have utilized the current whole-parcel Residential Reuse Project Plans (ABDS, March 11, 2015) and structural development envelope Grading, Drainage, and Erosion Control Plans (C. L. Grant/Midwest Foundation Tech, March 28, 2014) as the proposed development basis for this report. As a result of project design evolutions, the area of the roof garden proposed in preliminary project plans (ABDS, 2013) is now to be used for solar collectors and adjacent planters with native vegetation (ABDS, 2015). We have also incorporated into our analysis the recommended temporary lower construction bench, to be restored as a lower private open space area, and WRA's recommended adjacent downslope horticultural lemonade berry mitigation area.

² The 2,088 ft² area of the 1956-1978 house roof and lower patio reflects the area depicted on the City's 1965 aerial topographic map sheet 34/36, which we used to calculate developed conditions of the parcel prior to the 1978 ECDLL landslide. The building plan sheets 2 and 3 approved by the City for the house in November 1955 (Permit F3833) indicate the developer's calculation of the house area as 2,233 ft².

³ As further discussed below, we recommend retention of rainfall runoff in three specified water storage tanks, with a combined design capacity of 36,255 gallons (4,847 cf).

2.1 The Parcel and Its Drainage Subareas (Sub-Catchments)

The 1925 ECDLL parcel (2014-2015) extends between the southerly edge of the ECDLL right-of-way, near 140 feet Mean Lower Low Water (MLLW), and the Mean High Tide Line (MHTL) of the Santa Barbara Channel of the Pacific Ocean.⁴ Naturally occurring surfaces on the parcel are limited (March, 2015) to the surveyed distinct coastal bluff between elevations 11-12 and 52 feet, and the back beach, as a result of anthropogenic activities between 1946 and 1978 that have included grading for public infrastructure and private development, the 1978 ECDLL landslide, post-landslide grading by the City (1978) and a neighbor (Doolittle, 1978), and associated hydro-modification. Figure 2, our Pre-Landslide Drainage Map of 1925 El Camino De La Luz, Santa Barbara and Adjacent Areas, depicts the location of the estimated drainage subareas of the parcel prior to the February 11-14, 1978 landslide.⁵

Prior to the 1978 landslide, the parcel at 1925 ECDLL received drainage from seven subareas, in addition to the upper joint 1925-1927 ECDLL driveway pavement and its tributary drainage areas in the ECDLL right-of-way, on 1927 ECDLL, and on 1929 ECDLL:

(a) Pre-1978 landslide Sub-Catchment ("SC-PRE") 1, with 2,084 square feet of impervious surfaces, consisted of the garage apron concrete driveway at 1927 ECDLL, the joint 1925-1927 ECDLL concrete/AC pavement mid-driveway segment, the partly flared lower 1925 ECDLL concrete/AC driveway segment, and the concrete turnaround and house entry pavement to the north of the (1956-1978) upper level of the house at 1925 ECDLL. Drainage of SC-PRE 1 was generally to the head of the drainage ditch east of the carport and house, except that the house entry decking drained to the head of the descending concrete stairs in the west side yard of the house at 1925 ECDLL, marked SC-PRE 4a on Figure 2.

(b) SC-PRE 2, with 2,088 square feet of impervious surface, consisted of the roof of the house, carport, and lower level patio at 1925 ECDLL. Drainage from the westerly half of the house roof was to its southwesterly corner, and thence to SC-PRE 3. Drainage from the carport and easterly half of the house roof was to the drainage ditch along the

⁴ All elevations are in feet above Mean Lower Low Water (MLLW, NAVD88), unless otherwise indicated.

⁵ The ± 100 -foot length of the impervious upper joint 1925-1927 ECDLL driveway pavement (950 square feet) drained southeasterly across the easterly side-yard on 1925 ECDLL to the 1921 ECDLL driveway, which in turn discharged to the head of a drainage ditch that descended along the 1921-1925 ECDLL property line from east of the (1956-1978) house and carport on 1925 ECDLL.

1921-1925 ECDLL property line. Drainage from the lower level patio was downslope to SC-PRE 3.

(c) SC-PRE 3, with 1,858 square feet of impervious and semi-pervious surfaces, consisted of horticultural ice plant vegetation and the facially eroded manufactured slope below the lower level of the house, with an oblique (southwesterly trending) set of steps from the lower patio to the base of this slope near elevations 96-97 feet Mean Sea Level (MSL). Drainage from the slope and oblique steps below the lower level of the house was to SC-PRE 5.

(d) SC-PRE 4a, with 335 square feet of impervious and semi-pervious surfaces, consisted of the concrete steps and downslope path in the west side yard of the house at 1925 ECDLL. Drainage from the concrete steps and path in the west side yard was to SC-PRE 5 near the base of SC-PRE 3.

(e) SC-PRE 4b, with 405 square feet of impervious and semi-pervious surfaces, consisted of an 18-24 inch wide concrete surface along the east side of the carport and house on 1925 ECDLL, and the westerly slope of the descending drainage ditch that straddled the 1921-1925 ECDLL property line. Below elevations 110-115 MSL, the drainage ditch was located fully on 1921 ECDLL. Drainage from the concrete surface along the east side of the carport and house at 1925 ECDLL was to the adjacent drainage ditch along the 1921-1925 ECDLL property line. Drainage from within SC PRE-4b adjacent to easterly SC-PRE 3, and from the base of SC-PRE 3, was also to this drainage ditch, located here on westerly 1921 ECDLL.

(f) SC-PRE 5, with 1,338 square feet of semi-pervious and pervious area, consisted of the east-southeasterly downward sloping upper hillside yard at 1925 ECDLL, with fencing along the west and east property lines, horticultural lemonade plantings along the west fence, and the entry of an oblique south-southeast trending hillside path on 1927 ECDLL. Other horticultural lemonade berry plantings occurred along the boundary of SC-PRE 3 with SC-PRE-5. Drainage from this area at the base of the manufactured and planted slope below the house at 1925 ECDLL was to the south and east, to the widened and various vegetated drainage ditch/swale on westerly 1921 ECDLL.

(g) SC-PRE 6, with 6,760 square feet of semi-pervious and pervious area,⁶ consisted of the main lower yard at 1925 ECDLL, with continuing fences along its respective west and east property lines, a south-southeasterly trending downslope path,

⁶ For purposes of this Hydrology Report, we locate the coastal bluff edge (upper termination) prior to the 1978 ECDLL landslide along City (1965) topographic mapping elevation contour 50 feet MSL.

shrub, grass, and other low stature horticultural vegetation, and an east-west fence (with a gate) near the elevation 55 feet MSL contour. Drainage from this area was generally to the widened and variously vegetated drainage swale on the adjacent downslope hillside of westerly 1921 ECDLL, and in the area near the east-west fence on 1925 ECDLL, to the coastal bluff below it.

(h) SC-PRE 7, with 2,868 square feet of impervious and semi-pervious area, consisted of the laid-back pre-1978 landslide coastal bluff face in exposed Monterey Formation, locally with colonizing vegetation and a zig-zag beach access path excavated from the coastal bluff at 1925 and 1927 ECDLL.⁷ Drainage on the coastal bluff was generally downslope, as evidenced by colonizing bluff scrub vegetation (WRA, 2012) variously above and below the zig-zag path from the coastal bluff edge to the back beach. Locally, drainage was also downslope along the paths gradients.

(i) SC-PRE 8, with 1,093 square feet of impervious naturally occurring Monterey Formation, overlaying persistent cobbles, and seasonally accreted ≥ 1 -2 feet of littoral beach sand, consisted of the back beach area of the parcel at 1925 ECDLL.⁸ Drainage of the episodically intertidal back beach area was to seaward (southerly), to the Santa Barbara Channel of the Pacific Ocean.

2.2 El Camino De La Luz Municipal Storm Drain

The City ECDLL pavement, curbs, gutters, and drain inlet (DI) in the easterly ECDLL cul-de-sac currently (2014-2015) serve as the municipal storm drain for parcels that front on ECDLL, east of its intersection with Oliver Road. At the cul-de-sac, the elevation of the street pavement is shown by the City as 132.9 feet (City Public Works Department Topographic Map, 1997, Sheet D13). The inflow elevation at the DI in easterly ECDLL is 131.67 feet (City Public Works Department Storm Water Atlas, 2004, Sheet D13). Curb heights east of the parcel at 1925 ECDLL are generally 8 inches above the south gutter, and south-trending driveways from ECDLL are generally improved with additional berms in the pavement. These berms have succeeded the berms installed by the City after the 1978 landslide (Weaver, 1978, Figure 17.9) to prevent water in the ECDLL storm drain from discharging to the adjacent downslope parcels (ABDS, 2014, Photo-Documentation, Sheets G.01 and G.02). Some 29 parcels that front on ECDLL are variously developed with impervious surfaces, consisting of residence and garage roofs, driveways, and appurtenances that drain directly, or indirectly, to the ECDLL municipal storm drain. 14 of these parcels are located north, and 15 are located

⁷ For purposes of this Hydrology Report, we locate the base of the coastal bluff at elevation 10 feet MSL, as surveyed by the State Lands Commission in 1961.

⁸ For purposes of this Hydrology Report, we locate the southerly property line of the parcel along the MHTL as surveyed by the State Lands Commission in 1961.

south, of ECDLL, with 20 of them (10 each to the north and south) located west through north of the northwesterly 1925 ECDLL property corner.

Runoff in ECDLL typically flows (2010-2014), as a result of a slight crown near its centerline, eastward along both the north and south sides of the street toward the City storm drain inlet in the ECDLL cul-de-sac. The existing concrete curb and gutter on the south side of ECDLL (a) contains the peak 25-year design storm water in the street under current hydraulic conditions along ECDLL both west and east of 1925 ECDLL, and (b) contained the runoff from the supra-100 year storm event during the 1994-1995 Rain Year (7.45 inches/24 hours, as measured at the reference County/Flood Control station in Santa Barbara), without reports in City files of flooding from ECDLL of the downslope parcels.

CSA analyzed current runoff in ECDLL adjacent to (north of) the parcel at 1925 ECDLL by using detailed topographic survey data (CSA, 2014) from this area to map the runoff source area and to construct cross sections representative of worst-case conditions (i.e., lowest curb height and driveway height). We utilized the Rational Formula to calculate worst-case (>100-year) hydrology conditions (0.52 cfs) and we used Manning's equation to calculate the runoff capacity (12.1 cfs) in the area between the street centerline and the south curb/gutter. Appendix A contains CSA's quantitative analysis of these drainage conditions.

The current runoff capacity of ECDLL far exceeds the extreme event runoff rate for the existing fully developed ECDLL drainage sub-watershed during the City's design storm events, as well as the 100-year (additional 0.53 inch/24-hour) and 1,000 year (additional 2.81 inch/24-hour) rain storm events projected by the Santa Barbara County Flood Control District at the reference rain measurement station. The ECDLL storm drain runoff capacity also far exceeds the combined runoff from the design rainfall event (and 100- or 1,000-year events) and the maximum (post-peak hydrograph) 75 gpm pumped excess water discharge to the gutter from the proposed SWMS on the parcel.

To very conservatively provide additional driveway freeboard in the event of future extreme rain events during the 75-year regulatory economic life of the project, we recommend that the repaved/new driveway and restored adjacent side-yard to the present berm of the driveway be finished to a minimum of 4 inches (vertically) above the top of curb elevation. We also recommend that automatic back-flow control valves be installed in each excess storm water outfall at (through) the replacement curb, that they be regularly inspected and maintained prior to October 1st of each year, and that street gutter best maintenance practices prevent the placement or buildup of any curbside materials or debris that could impede the flow line along the gutter.

The proposed SWMS provides for prioritized and regulated discharge of intercepted storm water runoff that exceeds the City design storm events and capacity of the recommended water storage tanks. In the event it becomes necessary to establish capacity for one or more of the WST's to receive additional storm water runoff [e.g., from back-to-back rain storms, or when beneficial water reuse has not already drawn down the water level(s) in the tanks to accommodate the additional runoff], water in WST 1, 2, and/or 3 will be discharged, in order of priority, (a) by controlled gravity flow to energy-dissipated outfalls that discharge along the SC-18 and SC-19 boundary to the existing contiguous lemonade berry vegetation, (b) possibly to a City cistern in the ECDLL right-of-way (if the City opts to place one there), and/or, if necessary, (c) by pumping during periods of no or modest rainfall (<0.2 inch/hour), not to exceed 0.056 cfs (25 gpm) per tank, to the ECDLL municipal storm drain. The existing ECDLL storm drainage capacity more than accommodates the potential maximum discharge [0.168 cfs (75 gpm)] from all three tanks in the event they were to discharge simultaneously.

As noted above, CSA further recommends that the City consider installing a municipal cistern in the ECDLL right-of-way to receive and retain excess storm water runoff for fire suppression or other municipal uses. Such a cistern could also be connected to an additional fire hydrant on mid-ECDLL.

2.3 Summary of Storm Water Management Criteria

The City's Municipal Code Chapter 22.87, Stormwater Management (2013), the City's Storm Water BMP Guidance Manual (Manual, 2013), the State-certified LCP land use plan ("Local Coastal Plan") policies 8.1 and 8.2, and CCC's semi-standard storm water management and water quality regulatory program "special" conditions provide the criteria (standards) that have informed the preparation of this Hydrology Report.

2.3.1 City Municipal Code Chapter 22.87, Stormwater Management

The City Municipal Code (MC, Ordinance 5628, 2013) provides that "The Storm Water Runoff Requirements for a particular new development or redevelopment will depend upon the Project Tier to which the new development or redevelopment is assigned pursuant to Section 1.4 and Appendix J of the Guidance Manual." (MC Sec. 22.87.020). As noted in City staff Preliminary Review Team comments on the preliminary project plans (2013), the project is a "Tier 3 Hillside Residential" project on the basis that it proposes >500 square feet of impervious surface, and therefore is obligated to comply with the City Guidance Manual standards.

Pursuant to MC Chapter 22.87, the scope of the project storm water management and water quality analysis extends to the following three areas. If the new development or redevelopment is subject to (A) the requirement to maintain or reduce peak runoff discharge rates, then the discharge rate of the entire lot is considered when determining

the pre-development and post-development runoff discharge rate; (B) the requirement for runoff volume reduction, then the calculation of the runoff volume includes the change in discharge volume pre-development and post-development for the entire parcel; and, (C) the water quality treatment requirement, then the project site includes all impervious surfaces on the lot, not just the area of the new development or the redevelopment.

2.3.2 City Storm Water BMP Guidance Manual

Pursuant to City Guidance Manual Section 1.4 and Appendix J (Discretionary Projects Exempt from Tier 3 Requirements), the project generally constitutes a Tier 3 project because it is located in a designated Hillside District and subject to discretionary (coastal development permit) review. Pursuant to Guidance Manual Table 1-1, the Guidance Manual site assessment and BMP selection (Chapter 2), site soil and infiltration assessment (Chapter 3), site design and BMP options (Chapter 4), basic BMP options (Chapter 5), and storm water runoff BMP options (Chapter 6) generally apply to the hydrologic analysis of the parcel and project, within the applicable ranges of feasibility.

The Guidance Manual (Table 2.2) identifies the following “pollutants of concern” for single family residential projects that are located on City-designated “hillsides”: trash (debris and floatables), nutrients (nitrogen and phosphorous), bacteria (pathogens), sediment (both during and after completion of construction), hydrocarbons (oil and grease), pesticides (insecticides, rodenticides), and herbicides (fungicides).

The following discussion sequentially addresses each of these storm water management factors.

2.3.2.1 Site Assessment and BMP Selection

CSA has investigated, in relevant parts surveyed, and mapped the existing topography (terrain) of the parcel and tributary drainage areas (2010, 2014), including their respective significant geologic features, slopes, California coastal program “coastal bluff”, and both naturally occurring and anthropogenic (graded, paved, and otherwise developed and hydro-modified) subareas.

With regard to the existing hydrology and hydrography of the parcel, and (as applicable) its tributary drainage areas, CSA’s extensive field analysis (2008-2015) observed no seeps, springs, or waterways on the terrestrial subareas of the parcel. The back beach subarea constitutes variously a diurnal tidal and episodic storm super-elevated wave runup, wave spray, and occasional inundation zone (Skelly/Geosoils, 2012, 2015). During CSA’s subsurface geologic/ geotechnical investigation and subsequent piezometer monitoring (2011-2014, see Appendix B), additional information

about in-situ depths to groundwater (during a noted four-year exceptional drought) have been identified. CSA notes that contemporaneous at-grade photography of the 1978 ECDLL landslide envelope indicates likely saturation of fill, soil, and oxidized Monterey Formation following >140% of long-term average rainfall in the 1977-1978 Rain Year up to February 14, 1978, the “flood” prior to the landslide reported by the City and neighbors from ECDLL to 1925 ECDLL and adjacent parcels, and the City’s own 1978 landslide consultant’s reference to “septic water” constituting a factor in landslide activation at Santa Barbara.

During CSA’s topographic surveying, aerial photographic and topographic map analyses, and site/field observations and analysis, we identified drainage patterns on the parcel, within the project development envelope, in the tributary and associated drainage subareas/sub-catchments, and with regard to storm water discharges. Following the City’s installation of slip-lining in the Mesa Trunk Line sewer pipe, and proximate property owners’ repairing/replacing their sewer laterals, no elevated levels of pollutants associated with wastewater were identified by others in conjunction with our subsurface geologic investigation at and adjacent to the parcel in 2011. City publications present some important baseline hydrologic, water quality, land use (including transient habitation), and biological information about the Lighthouse Creek drainage, and identify one monthly monitoring location within its watershed (east of San Miguel Circle). However, they generally do not quantify any Lighthouse Creek drainage/storm drain flow or water quality monitoring data, and typically omit the ECDLL drainage subarea from the mapped watershed.⁹ Field observations by CSA staff of the Lighthouse Creek debouchment (2008-2014) have noted seasonal vegetation and algal mats, typically associated with elevated nutrients, along its incised spillway, and a polluted small plunge pool at its base. However, neither the Lighthouse Creek drainage/storm drain nor the receiving Santa Barbara Channel/Pacific Ocean receiving waters opposite the debouchment constitute a Clean Water Act Section 303(d) impaired “Listed Water Body” (<http://water.epa.gov/polwaste/npdes/stormwater/discharge.cfm>, last accessed May 29, 2015).

The Guidance Manual indicates that initial capital cost, BMP reliability, specific reduction goals for identified pollutants of concern, Tier 3 project storm water runoff management requirements, and continuing BMP maintenance over the long-term (economic life of the project) constitute relevant factors in the selection of project/site-specific BMPs. The Guidance Manual (pp. 2-5 and 2-6) provides that “BMPs shall be

⁹ See, e.g., City of Santa Barbara Creeks Division (Creeks Division), Water Quality Monitoring Report, 2001-2006, Figs. 1 and 2; Creeks Division, Fiscal Year 2012 Annual Water Quality Report; Creeks Division, Fiscal Year 2013 Annual Water Quality Report; and City/County “Southern Coastal Santa Barbara Streams and Estuaries Bioassessment Program 2014 Report and Updated Index of Biological Integrity”.

selected based on the following items to the maximum extent practicable: 1. site specific constraints; 2. pollutants of concern based on proposed land use type and receiving water conditions; 3. low impact development principles and practices; 4. meeting the post-construction storm water requirements based on the project tier; 5. cost considerations; and 6. long-term maintenance considerations.”

In this Report, incorporation of feasible relevant structural and operational BMPs into the project are specifically identified (recommended) to accomplish these objectives to the maximum practicable extent. As further discussed below, geologic conditions and the anthropogenically activated 1978 landslide that impacted the parcel preclude (prohibit) discharge/infiltration of collected storm water from impervious surfaces into the ground beyond that reasonably necessary to sustain the vegetation in the proposed open space areas and the horticultural lemonade berry mitigation area.

2.3.2.2 Site Soil and Infiltration Assessment

The site-specific (surface and subsurface) geologic and geotechnical investigation by CSA indicates that the back beach and post-1978 landslide graded [City (1978)/Doolittle (1984)] subareas of the parcel contain little soil, but consist (respectively) of (a) seasonal littoral beach sand that overlays a persistent cobble field, which reposes on the Monterey Formation shale beach plane (see also, Skelly/GeoSoils, 2012, 2015), and (b) variously fractured, graded, incompletely compacted, and oxidized Monterey Formation material, locally with concrete debris, interstices, artificial fill, and planted horticultural or ruderal vegetation (see also, WRA, 2012, 2015). Thin Monterey Formation bedding planes, in a dip-slope condition, underlay this material. CSA understands that City records contain no approved professional soil/grading plan, geological/geotechnical study, or post-grading compaction study to support its grading (1978) of the parcel. In our 2012 Geologic and Geotechnical Investigation Report, we recommended installation of horizontal drains beneath the residential reuse structural development envelope to collect in-situ groundwater, to avoid the potential for renewed high pore water pressures below this terrain. We therefore recommend against discharge of storm water runoff to ground beyond that required for the establishment and sustainability of the deep-rooted lemonade berry shrubs on the parcel (in Sub-catchments 18 and 19), which in their locations contribute to shallow slope stability.

We note that Sub-Catchment SC-19, with repositioned (1978) and subsequently matured horticultural lemonade berry shrubs, has remained grossly stable during the post-1978 Rain Years (1982-1983, 1992-1993, 1994-1995, 1997-1998, 2004-2005, and 2010-2011) in which precipitation at the reference measurement station exceeded 140% of the long-term mean annual rainfall (18.66 inches) and on one day exceeded the 100-year recurring 24-hour rain event, 7.24 inches, by 0.21 inch. Areas of the coastal bluff face have been colonized by coastal bluff scrub vegetation (WRA, 2012); however, concentrated discharge of storm water tends to erode it along rills. Such storm water

discharge is, in any event, prohibited by the State-certified City LCP where, as here, feasible alternatives are available to discharge of storm water to the coastal bluff edge, face, or base. The artificial fill and alluvium (Baywood clayey loam, generally to a five-foot depth) that underlies the 12.5-foot wide by 175-foot long driveway segment (+2,200 square feet) of the parcel is both too small a volume of earthen materials to feasibly accept infiltration of storm water to ground from the entire parcel, and also discharges to the strata for which we recommend the subsurface horizontal drains to avoid renewed high pore water pressures.

2.3.2.3 Site Design

The architectural project design of the residential reuse project proposes a reduction (146 ft², or 7%) in impervious roof and patio surfaces when compared to the previous modestly-sized house and patio on the parcel. The proposed impervious driveway and turnaround areas constitute necessary project compliance with adopted applicable City development standards. Some two-thirds of the parcel will be vegetated on post-project completion with colonized and horticultural native vegetation. As noted above, storm water runoff from the structural development envelope during the City design storm events will be intercepted and retained for beneficial on-site (and potential public agency) reuse.

Figure 1, the Post-Project Construction Completion Drainage Map, illustrates the location of the proposed project BMPs as follows (with some BMPs occurring under more than one category):

- (a) In-Situ Terrain Conservation and, as applicable, Restoration: Sub-Catchments (SCs) 5, 6, 11, 12, 17, 18, 19, 20 and 21, with a combined area of 14,222 ft².
- (b) Maintained, Restored and/or Enhanced Drainage Flow Paths: SC's 3, 4, 19, 20, 21, with a combined area of 12,359 square feet.
- (c) Collected/Retained Storm Water Runoff (Design Storm Events) for Beneficial Reuse: SC's 5, 6, 7, 8, 11, 12, 13, 14, 15, with an area of 7,589 square feet, and subgrade SC-16 horizontal drains.

In total, Sub-Catchments with structural and/or operational storm water management BMPs, including offers to dedicate open space/conservation and public access easements comprise 100% of the parcel.

In Appendix C, we list recommended BMPs, which utilize native vegetation landscaping, filtration, water [Ultra-Violet Light (UVL)] treatment, scheduled SWMS maintenance, monitoring/reporting, and adaptive management to intercept, treat, retain,

and reuse the storm water runoff generated during the City design storm events. The recommended good housekeeping practices and filtration BMPs will substantially remove the relatively small quantities of water pollutants of concern that the detached single-family residential reuse project will likely generate from existing and new impervious surfaces. Feasible efficiencies, and attendant limitations on direct and operational BMP costs, have been incorporated into the SWMS by reasonably minimizing source areas and potential pollutant loadings, utilizing gravity flow of water wherever feasible to collect/retain water for beneficial (non-potable) reuse, limiting and regulating pumped excess water discharges to the ECDLL municipal storm drain, and providing for regular monitoring, maintenance, and adaptive management of SWMS components.

CSA recommends that the project incorporate drain inlets, with specified filtration capacity, to capture storm water runoff from (1) the restored upper private open space in SC-5; (2) the proposed widened/new driveway and adjacent easterly side yard in SC-6; (3) the restored upper side yards adjacent to the house and turnaround in SC-11 and SC-12; (4) the house/garage roof areas in SC-13 and SC-14; and (5) the lower house level patio in SC-15.

CSA further recommends that the project incorporate trench drains, with specified filtration capability, to capture storm water runoff at the base, respectively, of (6) the existing joint 1925-1927 ECDLL driveway pavement in SC-4; (7) the proposed (required) new widened 1925 ECDLL driveway in SC-7; and (8) the garage entry driveway/turnaround in SC-8. Trench Drain 4P will be located in SC-5, immediately south of the SC-4/SC-5 boundary. CSA recommends against the utilization of semi-pervious (quasi-permeable) pavers in the new widened driveway (or to replace the existing joint driveway), given the importance of avoiding potential introduction of water and consequent higher pore water pressures in the subsurface. Restoration of SC-5 and SC-17 as private open space areas with native vegetation, incorporation of native vegetation planters in SC-14, and planting of horticultural native vegetation in SCs 6, 11, 12, 17, and 18 further contribute to minimizing impervious surfaces on the parcel.

CSA also recommends that all roof downspouts in the project be fully sealed to discharge only to their respective WSTs. Given that the Emprise Trust owns only the parcel at 1925 ECDLL and other parcel owners beyond its control hold driveway easements on 1925-1927 ECDLL and 1921-1919 ECDLL, the project cannot feasibly unilaterally implement a driveway consolidation among them that might otherwise result in a potential 20-25% reduction in driveway pavement impervious surface coverage, compared to current and proposed conditions. The parcel also contains no existing anthropogenic drainages, depressions, streams, wetlands, or riparian areas (WRA, 2012, 2015) that could, if they were otherwise present, potentially receive new (or additional) clean storm water runoff.

2.3.2.4 Basic BMP Options

As itemized in Appendix C, CSA recommends incorporation of the following “basic BMPs” in the project: (a) horticultural native vegetation landscaping (SCs 5, 6, 11, 12, 14, 17, and 18); (b) three subsurface water storage tanks, with a combined retention capacity of >36,000 gallons; (c) non-erosive runoff flow distribution from SC-17 to SC-18, for establishment and sustainability of the horticultural lemonade berry mitigation area; (d) non-erosive discharge of excess storm water (to the storage tank capacity) to SC-19, for sustainability of the existing contiguous lemonade berry vegetation; and (e) utilization of contained drought-tolerant native landscaping (planter boxes, pots, etc.) on the flat roof in SC-14, adjacent to the steps from the lower house level to the lower patio, and on other similar surfaces, wherever feasible.

On Figure 1, the Post-Proposed Project Construction Drainage Map, the location of the respective hydrologic Sub-Catchments (SCs) and principal drain inlets (DI's), trench drains (TD's), water storage tanks (WST's), drain pipes, and cobble-lined flow lines are identified.

2.3.2.5 Storm Water Runoff BMP Options

The hydrology analysis performed by CSA of the proposed residential reuse project (ABDS, March 11, 2015; C.L. Grant/Midwest Foundation Tech, 2014) specifically incorporates the City's Tier 3 requirements for peak runoff discharge control, volume reduction, and water quality treatment, as follows:

(a) Peak Runoff Discharge Control - The recommended storm water runoff BMPs are designed to provide interception and retention (detention) of storm water such that the post-development peak storm water runoff discharge rate (as per the method for calculation in Guidance Manual Appendix C) does not exceed the pre-development rate for the City's design 2-, 5-, 10-, and 25-year/24-hour rainfall events.

(b) Volume Reduction - The recommended storm water runoff BMPs are designed to retain on-site the volume difference, for the 25-year, 24-hour design rainfall event, between the current (2014) and pre-1978 landslide conditions on the parcel and the post-residential reuse project completion conditions on the parcel. As already noted, storm water runoff from SC-17 is proposed to be non-erosively discharged to sustain the horticultural lemonade berry mitigation plantings in SC-18. Storm water collected by the SWMS in excess of the capacity of the three WSTs is proposed to be non-erosively discharged to sustain the existing contiguous lemonade berry vegetation in SC-19. Recommended installation of earthen water bars across the re-vegetating/closing surveyor's path (2005) that

meanders along the westerly 1925 ECDLL property line will beneficially reduce current erosion of parts of the coastal bluff from episodic storm water runoff.

(c) Water Quality Treatment - Given that infiltration of all (or even most) of the storm water from the structural reuse development envelope to ground is infeasible for geotechnical reasons, CSA has conceptually designed a suite of passive and active storm water treatment BMPs for all intercepted storm water runoff (up to and including from the 25-year, 24-hour event) that is retained in WSTs 1, 2, and 3. The proposed water treatment capacity/performance thus substantially exceeds the (inapplicable to this project) volumetric (1-inch/24-hour) or flow-based (0.25-inch/hour for 4 hours) model flow-based water runoff BMP requirements.

The Guidance Manual (p. 6-4), requires the project to select a single storm water runoff BMP, or a combination of such BMPs, based on the (any) pollutants of concern anticipated to be generated by the project land use (as identified in Guidance Manual Table 2-2), and/or by the BMP selection matrices (Guidance Manual Table 6-1, p. 6-5, and Table 6-2, p. 6-6). The Guidance Manual requires that the selected BMP(s) shall be suitable for the site conditions and be designed to be effective in reducing pollutants of concern as outlined in Section 1.2.1. As indicated above, CSA recommends that the project incorporate a suite of structural and operational building (planter boxes, dual plumbing to facilitate on-site beneficial storm water reuse), water storage tanks for beneficial reuse (extended retention and detention), and proprietary water interception and water quality treatment (catch basins, filtration, UVL treatment) BMPs. These BMPs are both specifically compatible with, and functionally (feasibly) capable of implementing the standards and objectives of the Guidance Manual and CCC's guiding decisions.

CSA notes that in the Guidance Manual (p. 6-4) it is recognized that storm water runoff BMP requirements may be waived for technical and/or legal unfeasibility, as follows: "The City may allow for one or more of the storm water runoff requirements to be waived for a Tier 3 project if technical or legal infeasibility can be established by the project applicant. The City shall only grant a waiver of infeasibility when all available storm water runoff BMPs have been considered and rejected as infeasible. The burden of proof is on the project applicant to demonstrate that all available measures are infeasible. Where strict compliance with the City's storm water runoff requirements are infeasible, the project applicant must utilize all feasible measures to achieve the greatest compliance possible." As discussed *infra*, for this Hydrology Report we have considered a wide range of, and recommend all feasible, on-site storm water management measures (BMPs) given the constraints of the parcel, its terrain, adopted City and CCC conservation and development standards, and the diverse property interests in the joint

1925-1927 ECDLL and adjacent 1921 ECDLL (1919 ECDLL easement) driveways. There is no hydrologic value in reducing the already modestly-sized replacement house roof [with a gross area of 2,190 square feet, of which 248 square feet consist of native vegetation planters (and an additional 697 square feet constitute the area for solar panels)], given that the proposed SWMS will intercept 100% of the storm water runoff during the peak City design storm for on-site beneficial reuse, and under most circumstances will convey excess storm water to the contiguous lemonade berry shrubs in SC-19, for their sustainability.

2.3.3 State-Certified LCP Land Use Plan (“Local Coastal Plan”) Policies 8.1 and 8.2

The California Coastal Commission (CCC) has certified the City’s Local Coastal Program (LCP) land use plan (LUP, locally styled the “Local Coastal Plan”) as consistent with and adequate to implement the State’s conservation and development policies for the coastal zone at the local level. In the coastal zone, the provisions of the LCP (and the Coastal Act, as applicable) control over City-adopted General Plan, Municipal Code, and other measures where they conflict with the LCP (or Coastal Act). The LUP in relevant part governs changes in physical storm water management, a change in the intensity of use of water that constitutes California Coastal Act and LCP regulatory “development”.

Certified LUP Policy 8.1 provides that “All new development of bluff top land shall be required to have drainage systems carrying run-off away from the bluff to the nearest public street or, in areas where the landform makes landward conveyance of drainage impossible, and where additional fill or grading is inappropriate or cannot accomplish landward drainage, private bluff drainage systems are permitted if they are: (1) Sized to accommodate run-off from all similarly drained parcels bordering the subject parcel’s property lines; (2) The owner of the subject property allows for the permanent drainage of those parcels through his/her property; and (3) The drainage system is designed to be minimally visible on the bluff face.”

The proposed residential reuse project development envelope, including its proposed storm water drainage structural and operational BMPs, are located in their entirety well to landward of the upper termination (edge) of the distinct precipitous coastal bluff, i.e., on the coastal bluff top (CSA, Geologic and Geotechnical Investigation Report Supplement, 2015; ABDS, Site Plan, March, 2015). ECDLL constitutes the nearest (adjacent) public street to the parcel. Landward conveyance of excess storm water from the development envelope to the City’s ECDLL municipal storm drain is possible (feasible) by pumping when necessary, but generally less preferable than utilizing this water to sustain the contiguous deep-rooted lemonade berry shrubs on the parcel. The proposed project includes no discharge of storm water from the structural development envelope to or over the distinct coastal bluff on the parcel.

Consideration may, however, be given by the City to installing a cistern (holding tank) in the ECDLL street right-of-way, to which excess storm water from the parcel could also be pumped for City (public agency) beneficial reuse, in addition to proposed City public agency emergency access to retained (detained) storm water in WST-1 and WST-3 by the proposed dry stand pipe adjacent to ECDLL. Thus, consistent with the State-certified LCP, storm water that cannot be otherwise incorporated in the project design (i.e., through beneficial on-site or public reuse) is required to be discharged to the ECDLL municipal storm drain. The proposed project fully and specifically conforms to LUP policy 8.1.

Policy 8.2 provides that “with the exception of drainage systems identified in Policy 8.1, no development shall be permitted on the bluff face except for engineered staircases or access ways to provide public beach access and pipelines for scientific research or coastal dependent industry. To the maximum extent feasible, these structures shall be designed to minimize alteration of the bluff and beach.” Consistent with Policy 8.2, the recommendations of this Hydrology Report and the proposed project include no structural development on the coastal bluff face of the parcel. The proposed project instead includes restoration of the small upper bluff face area that has been degraded by trespass and an offer to dedicate an open space/conservation easement to the City over the coastal bluff face.

2.3.4 Coastal Commission Regulatory Program Storm Water Criteria.

As part of its coastal zone development regulatory program, the CCC has provided additional guidance with regard to storm water management in the coastal zone through applied “special conditions” of coastal development permit (CDP) approval. The CCC’s criteria for permanent drainage and polluted runoff control require preparation, by a qualified licensed professional, and submittal of a “Drainage and Runoff Control Plan” (DRCP) for the post-construction project site. The DRCP must include detailed and prioritized drainage and runoff controls, with supporting calculations, and incorporate long-term post-construction Best Management Practices (BMPs) that protect water quality and minimize increases in runoff volume and rate in the project design of developments, as follows:

1. Site Design BMPs - Project design features that reduce the creation or severity of potential pollutant sources, or reduce the alteration of the project site’s natural storm water flow regime. Examples are minimizing impervious surfaces, preserving native vegetation, and minimizing grading.
2. Source Control BMPs - Methods that reduce potential pollutants at their sources and/or avoid entrainment of pollutants in runoff, including schedules of activities, prohibitions of practices, maintenance procedures, managerial

practices, or operational practices. Examples are covering outdoor storage areas, use of efficient irrigation, and minimizing the use of landscaping chemicals.

3. Treatment Control BMPs - Systems designed to remove pollutants from storm water by gravity settling of particulate pollutants, filtration, biological uptake, media adsorption, or any other physical, biological, or chemical process. Examples are vegetated swales, detention basins, and storm drain inlet filters. Where post-construction treatment of storm water runoff is required, treatment control BMPs (or suites of BMPs) shall, at a minimum, be sized and designed to treat, infiltrate, or filter storm water runoff from each storm event, up to and including the 85th percentile, 24-hour storm event for volume-based BMPs, or the 85th percentile, 1-hour storm event (with an appropriate safety factor of 2 or greater) for flow-based BMPs.

Appendix D contains CCC's specific storm water management criteria. CSA recommends that these criteria be incorporated into the project building plan and grading/drainage plan general notes.

3.0 PURPOSE AND SCOPE OF WORK

CSA has conducted the analysis summarized in this Hydrology Report at the request of the Emprise Trust and in response to the City of Santa Barbara "Preliminary Review Team" staff comment IV.A.7 on the preliminary residential reuse project plans for the parcel (2013). City staff's request for a Hydrology Report references criteria in the City's Storm Water BMP Guidance Manual by which the project can incorporate design solutions that will capture, contain, and/or treat storm water runoff, and thereby meet the City's storm water requirements for (1) water quality treatment, (2) peak runoff discharge rate, and (3) volume reduction for the entire site (parcel). In addition to the City's adopted Municipal Code (Stormwater Ordinance), the CCC-certified City Local Coastal Program and CCC's adopted development regulatory storm water program "special conditions" provide further criteria for our hydrologic analysis and this Hydrology Report.

The purpose of this Hydrology Report is therefore to first characterize the drainage areas, at relevant points in time, that discharge to, or are located on, the parcel, and second, to analyze the hydrology of the parcel under its previously residentially developed condition (pre-1978 landslide), currently developed condition (2014-2015), and proposed post-residential reuse project construction, conservation, and restoration completion conditions (ABDS, 2015; C. L. Grant/Midwest Foundation Tech, 2014; Skelly/GeoSoils, 2015; and WRA, 2015).

The substantive objectives of this hydrologic analysis were to:

(a) Quantify storm water runoff, under previously developed and current conditions, as a result of the City's design storms, up to and including the 25-year 6.71-inch/24-hour rainfall event;¹⁰

(b) Quantify storm water runoff, under the proposed completed project (with CSA's recommendations incorporated into it), as a result of the City's required spectrum of design rainfall events (2-year recurrence, 24 hour, 3.20 inches; 5-year, 24 hour, 4.61 inches; 10-year, 24 hour, 5.55 inches; and 25-year, 24 hour, 6.71 inches);

(c) Quantify groundwater flows that will be intercepted by the project's three subsurface horizontal drains (CSA, 2012; ABDS, 2014; C. L. Grant/Midwest Tech, 2014) based on: (1) groundwater data developed by CSA's geological and geotechnical investigation, and (2) assumed saturated conditions of the ground to the east (heads) of the horizontal drains below the upper west side yard (SC-11), the upper private open space (SC-5), and lower driveway areas (SC-7; see Figure 1);

(d) Conceptually design a suite of feasible structural and operational BMPs, with protocols for maintenance, monitoring/reporting, and adaptive management over the regulatory 75-year economic life of the project, that: (1) reduce the peak design storm runoff rate from the completed proposed project relative to previously developed/current conditions; (2) reduce overland flow (storm water runoff) from the entire parcel up to and during the design peak storm event to below previously developed/current conditions; and (3) treat intercepted (retained, detained) storm and ground water to protect and enhance water quality (including with respect to pollutants of concern) both for beneficial (on-site and potential public) reuse and for receiving waters; and

(e) Prepare the required Hydrologic Report that summarizes CSA's hydrologic analysis and presents the suite of recommended feasible structural and operational BMPs to implement it.

To these ends, our recommendations have been designed to specifically (1) avoid (reduce, to the maximum extent practicable) high pore water pressures within the oxidized landform conditions in the project development envelope, and thereby

¹⁰ CSA's Hydro-CAD hydrologic analysis software also includes analysis and output for the 1-year recurrence, 24-hour, 1.00-inch rain event, which we therefore also present in our technical analysis, although it is not required by the City Guidance Manual.

contribute to landform stability; (2) maximize feasible on-site and potential City (public agency) storm water reuse from impervious surfaces associated with the modestly-sized house and necessary appurtenances; (3) maximize feasible on-site retention of storm water, while limiting controlled discharge of excess water to the municipal storm drain to before or after passage of the peak design storm hydrograph; (4) enhance and maintain storm water quality through a suite of structural and operational filtration and treatment BMPs; and, (5) maintain, monitor/report, and adaptively manage the long-term functionality of the proposed storm water management system (SWMS).

CSA notes that, under current (2014-2015) conditions, portions of the adjacent parcels at 1929 ECDLL and 1927 ECDLL drain to the existing joint 1925-1927 ECDLL driveway, and that portions of 1917 ECDLL, 1919 ECDLL, and 1925 ECDLL under current conditions drain to 1921 ECDLL. The proposed residential reuse project does not alter the existing surface drainage patterns from these tributary areas to Sub-Catchments 3, 4 and 10. However, since the proposed project includes repaving the existing joint 1925-1927 ECDLL driveway segment on 1925 ECDLL, CSA (a) has evaluated continued storm water discharge from 1925 ECDLL to the 1921 ECDLL driveway for analytical completeness, and (b) presents recommendations for in-situ water quality and modernized flow line BMPs with regard to it.

4.0 METHODOLOGY

CSA has performed the hydrology analysis described in this report pursuant to the City's adopted Storm Water Best Management Practices Guidance Manual (July, 2013),¹¹ Ordinances for Control of Erosion/Sedimentation During Construction and Storm Water Management (Municipal Code Chapters 22.85 and 22.87),¹² and other applicable standards contained in the adopted General Plan, State-certified City Local Coastal Program (LCP), and California Coastal Commission (CCC)-adopted development regulatory storm water management "special conditions". Together these criteria (standards) variously require, recommend, and/or suggest that the proposed residential reuse and conservation/restoration project incorporate feasible site design elements and best management practices (BMPs) that enable (1) management of peak storm water discharge from the parcel (e.g., through retention, non-erosive utilization, delayed release, etc.), (2) reduction of runoff volume in comparison to pre-project conditions, and (3) maintenance, protection, and enhancement of the quality of storm water, whether reused on the site, provided for municipal reuse, or discharged to the ECDLL municipal storm drain.

¹¹ <http://www.santabarbaraca.gov/civicax/filebank/blobdload.aspx?BlobID=16665>, last accessed on May 29, 2015.

¹² <http://www.santabarbaraca.gov/civicax/filebank/blobdload.aspx?BlobID=12168>, last accessed on May 29, 2015.

CSA has therefore conducted this hydrology analysis to quantitatively characterize and evaluate surface water runoff, during the spectrum of City design rainfall events, to and from the parcel under (1) pre-1978 landslide developed conditions, (2) current (2014-2015) conditions, and (3) post-proposed residential reuse and conservation/restoration project completion conditions. Discharge of storm water to ground (e.g., by infiltration or deep dry wells) in the dipslope Monterey Formation at the parcel is not recommended given the importance of avoiding high pore water pressures and potential consequent reactivation of the anthropogenically activated 1978 ECDLL landslide (CSA, 2012, 2015). Our post-project completion hydrologic analysis therefore also includes the proposed (CSA, 2012) interception and retention, for beneficial reuse, of shallow groundwater by horizontal drains installed beneath the residential reuse development envelope (estimated flow rate of less than 0.1 csf).

4.1 Pre-1978 Landslide and Current (2014-2015) Conditions

4.1.1 Pre-1978 Landslide Conditions

Our geospatial characterization of storm water drainage in the area of, and on, the parcel prior to the February 11-14, 1978 “ECDLL landslide” is based on our (1) analysis of the stereo pair and other historic photographic records (1928-1975) of the area that includes the parcel; (2) review of Santa Barbara City/County Flood Control District aerial topographic mapping (1965), City of Santa Barbara Public Works Department topographic mapping (1978); (3) site-specific surface and subsurface geological and geotechnical investigation, and subsequent piezometer monitoring (2008-2014); (4) review of geological, geotechnical, 1978 landslide, and drainage reports and maps prepared by others for the sub-watershed that includes the subject parcel,¹³ and (5) review of site and design plans (1956) for the house (1956-1978) and appurtenances on the parcel. References in this report to Santa Barbara precipitation data are to the daily records obtained by Santa Barbara County (Santa Barbara County Flood Control District) at the long-term (1952-present) downtown Santa Barbara Station 234 precipitation reference site.¹⁴

We base our identification of substantial water discharge/s during the pre-February 14, 1978 Rain Year from the municipal ECDLL storm drain to and along the

¹³ CSA’s Geologic and Geotechnical Investigation Report, 1925 El Camino de la Luz, Santa Barbara, California (2012) lists these documents through that report date. Our “Supplemental Geological and Geotechnical Investigation Report” (2015) lists documents that we have reviewed/analyzed subsequently.

¹⁴ <http://cosb.countyofsb.org/pwd/water/downloads/hydro/234dailys.pdf>, last accessed on May 29, 2015.

joint 1925-1927 ECDLL and 1921 ECDLL (1919 ECDLL easement) driveways on (1) the City's own characterization, in an emergency funding request to the federal government, of the discharged water as a "flood"; (2) concurrent observations in January-February, 1978 by adjacent resident property owners; (3) the description of anthropogenically water-saturated conditions in the City consultant's report on the ECDLL landslide (March 6, 1978), (4) contemporaneous at-grade and aerial photographic imagery that appear to depict saturated earthen material and respective flow lines, (5) photo-documentation of the City's hydro-modification measures shortly after February 14, 1978, including at the head of the driveways (in the street right-of-way) to prevent water in the ECDLL municipal storm drain from discharging to and downward along the driveways, (6) photo-documentation and topographic survey mapping of the City's post-1978 landslide cut and fill grading, with hydro-modification of the parcel between elevations 60-70 feet and 130 feet MLLW, and (7) subsequent re-pavement modifications that, at 1925-1927 ECDLL and 1921 ECDLL, established raised berms to succeed the City's berms in the upper driveways to prevent overtopping by water in the municipal ECDLL storm drain.

We have mapped the identified pre-1978 ECDLL landslide drainage sub-catchments (SC-PRE 1 through SC-PRE 21) on the parcel in Figure 2, the Pre-Landslide Drainage Map (June, 2015).¹⁵ In Section 7 below, we summarize our quantitative analysis of current storm water runoff from the pre-1978 ECDLL Landslide Sub-Catchments during the City's 25-year 6.71-inch/24-hour rainfall design storm event.

4.1.2 Current (2014-2015) Conditions

We base our geospatial characterization of current (2014-2015) storm water drainage on our topographical surveys of the tributary sub-watershed area and of the parcel (CSA, 2010, 2014). We have identified 16 sub-catchments that in whole or part are located on the parcel, receive rainfall, or rainfall and overland flow from adjacent parcels, and generate storm water runoff. The existing slope gradients of the deteriorated upper joint 1925-1927 ECDLL driveway pavement and berm serve to provide protection against a recurrence of the reported overtopping of the driveway by storm water in the ECDLL municipal storm drain in 1978. A similar berm is present on the 1921-1919 ECDLL driveway.

¹⁵ The upper joint 1925-1927 ECDLL driveway and adjacent east side yard at 1925 ECDLL, north of Sub-Catchment 1, drained east-southeast to the 1921 ECDLL driveway, and thence along it to the head of the drainage ditch, near elevation 126 feet MSL (off the northeast corner of the carport at 1925 ECDLL, in sub-catchment SC-PRE 2), and then downslope in the drainage ditch along the 1921-1925 ECDLL property line east of the carport and house at 1925 ECDLL.

We identify the following existing (2014-2015) Sub-Catchments on 1925 ECDLL:

(1) Partial SC-3, 330 ft², the existing AC pavement of the joint 1925-1927 ECDLL driveway (ABDS, March, 2015);

(2) Partial SC-4, 210 ft², the existing AC/concrete pavement of the lower 1925 ECDLL driveway (ABDS, March, 2015);

(3) SC-5, 884 ft², the relict (1956-1978) house entry, carport driveway, and turnaround AC/concrete pavement, overlain by a thin earthen fill blanket, ± 540 square feet, and the locally rilling eroded City (1978) upper Mesa Trunk Line Sewer fill buttress, ± 344 square feet;¹⁶

(4) SC-7, 653 ft², the relict (1956-1978) carport driveway and turnaround AC/concrete pavement, overlain by a thin fill blanket, ± 300 ft², and the locally rilling eroded City (1978) upper fill buttress, ± 353 ft² to the east of SC-5;

(5) SC-6, 1,615 ft², the side yard east of the driveway, vegetated variously with ruderal and horticultural species both in-ground and in containers;

(6) SC-8, 958 ft², part of the City (1978) Mesa Trunk Line Sewer earthen buttress;

(7) SC-11, 465 ft², part of the City (1978) earthen buttress, upslope of 105-110 feet MLLW, and of part of the City (1978) excavation (earthen material borrow) area between 94-105/110 feet MLLW;

(8) SC-12, 363 ft², part of the City (1978) fill buttress, upslope of 110 feet MLLW, and part of the City (1978) excavation (earthen material borrow) area between 94-105/110 feet MLLW;

(9) SC-13, 1,245 ft², in parts the City (1978) excavation (earthen material borrow) area between existing surface elevation 97-98 feet MLLW and 105 feet MLLW, and the

¹⁶ SC-6, 1,615 square feet total, in its existing (2014-2015) condition consists of planted horticultural vegetation, potted horticultural vegetation, a small (1 foot wide) concrete V-ditch, an older wooden fence (with a gate and seasonal sandbags along its base) near the boundary on 1925 ECDLL with SC-7, and an older metal fence with planted adjacent horticultural vegetation on the proposed 1925 ECDLL driveway easement area on westerly 1921 ECDLL. SC-10 consists of the existing 1921 ECDLL driveway, with adjacent side yards and the tributary garage apron on 1919 ECDLL; the latter parcel has a driveway easement on the 1921 ECDLL driveway.

City (1978) semi-compacted Mesa Trunk Line Sewer earthen buttress, upslope of 110 feet MLLW;

(10) SC-14, 945 ft², part of the City (1978) excavation area to obtain earthen material for construction of the Mesa Trunk Line Sewer earthen buttress;

(11) SC-15, 461 ft², the landward (upper) edge of the City (1978) semi-compacted 1978 landslide debris fill cover;

(12) SC-17, 1,516 ft², in parts the surface of the City (1978) semi-compacted 1978 landslide debris fill cover, locally with buried concrete debris, and along its westerly edge, the Doolittle (1984) landslide repair (transition slope excavation and borrow material) grading envelope;

(13) SC-18, 590 ft², the surface of the toe of the City (1978) semi-compacted 1978 landslide debris fill cover, locally with buried concrete debris;

(14) SC-19, 6,361 ft², the vigorous contiguous lemonade berry vegetation downslope of the City (1978) grading envelope and in part on the Doolittle (1984) excavation grading envelope on the parcel, between elevations 50 and 93 feet;¹⁷

(15) SC-20, 1,658 ft², the distinct California coastal program coastal bluff on the parcel;¹⁸ and

(16) SC-21, 2,110 ft², the back beach area of the parcel, with cobbles and seasonal littoral beach sand, between the MHTL (State Lands Commission, 1961) and the base (toe) of the coastal bluff.¹⁹

On Figure 3, the Current (2014-2015) Drainage Conditions Map, the location of these drainage Sub-Catchments is depicted.

¹⁷ The proposed project includes an open space/conservation easement for this Sub-Catchment.

¹⁸ The proposed project includes an open space/conservation easement for this sub-catchment.

¹⁹ The proposed project includes a lateral public access easement for this sub-catchment. As noted by Skelly/GeoSoils (2012, 2015), the proposed project neither includes nor requires a shoreline protective structure (seawall, revetment, etc.).

4.1.3 Subsurface Hydrology

Our subsurface hydrologic characterization of the parcel reflects observations of (1) in-situ groundwater during large-diameter geologic/geotechnical borehole down-hole logging by CSA (2012), (2) observed earthen material moisture gradients by CSA during small-diameter borehole drilling and logging in 2011, and (3) piezometer readings performed at borings SD-1 and SD-2 beginning in 2011. Appendix B contains a copy of all of CSA's piezometer readings at the two boring locations. CSA staff has observed no seepage of water through the distinct coastal bluff on the parcel during the dry and wet seasons since 2008.

4.2 Proposed Residential Reuse and Conservation/Restoration Project

In CSA's preparation of the hydrologic analysis of the proposed project (post-project completion) drainage conditions, we utilized the 1997, 2010 (2005), and 2014 topographic surveys of the parcel and adjacent areas, our Geologic and Geotechnical Investigation Report (2012) and Supplement (2015), in-progress project architectural site plans and sections (ABDS, 2014 and March, 2015), in-progress project grading, drainage and erosion control plans and sections (Charles L. Grant/Midwest Foundation Tech, 2014), the in-progress project site and Study Area biological reconnaissance assessment (WRA, 2012, 2015), the project/parcel wave run-up/coastal hazards analysis report and report update (Skelly/GeoSoils, 2012, 2015), and recommendations therein that relate to parcel hydrology.

CSA understands that the project plans, as finalized for transmittal to the City as part of the project entitlements application, will in relevant parts incorporate the recommendations of this report. The project drainage and storm water best management practices plans have thus been prepared in coordination with the project development, conservation/restoration, design, and grading plans, consistent with the methodological standards provided by the City and CCC. CSA will review the final project drainage plans prepared by the project civil/structural engineer (Charles L. Grant/Midwest Foundation Tech) prior to application package submittal to the City, and will indicate CSA's review and approval of them by a subsequent letter that will accordingly be signed by CSA's licensed project geotechnical engineer or engineering geologist.

4.3 Post-Project Completion Sub-Catchments

As shown on Figure 1, CSA has identified (defined, delineated) seventeen Sub-Catchments (SC's) for the parcel to characterize the proposed post-project completion

drainage conditions, including the location of some of the recommended storm water management BMPs, as follows:²⁰

- (a) Sub-Catchment 3 (1,029 ft²), the upper-driveway pavement on the parcel and contiguous driveway pavement on 1927 ECDLL, which are proposed to continue to drain to 1921 ECDLL;
- (b) Sub-Catchment 4 (1,201 ft²), the lower-driveway pavement on the parcel and contiguous driveway pavement on 1927 ECDLL that drains to the parcel, which are also proposed to continue to drain to 1921 ECDLL;
- (c) Sub-Catchment 5 (884 ft²), which the project proposes to restore as private open space, with native vegetation plantings. SC-5 is proposed to drain to proposed water storage tank (WST) 2, which is located on 1925 ECDLL beneath the pavement of the garage entry driveway and turnaround (SC-8);
- (d) Sub-Catchment 6 (1,615 ft² total area), the proposed new (widened) driveway pavement located on 1925 ECDLL, and in part on the proposed 1925 ECDLL driveway easement on adjoining 1921 ECDLL, with 1,340 ft² of driveway pavement and 275 ft² of low stature native vegetation in the east side yard of the driveway - this area is proposed to drain to proposed water storage tank (WST) 1, which is located on 1925 ECDLL beneath the southerly end of this driveway pavement;
- (e) Sub-Catchment 7 (653 ft²), the proposed new lower driveway segment on easterly 1925 ECDLL and the adjacent (to 5 feet wide) driveway easement on westerly 1921 ECDLL. This area drains to proposed WST 2;
- (f) Sub-Catchment 8 (958 ft²), the proposed new lower driveway to the new garage and vehicular turnaround here, also to drain to proposed WST 2;
- (g) Sub-Catchment 10 (3,599 ft²) consists of the westerly side yard, adjacent driveway pavement (locally with a retaining wall), and easterly side yard of 1921 ECDLL between the crown (berm) in the upper driveway and a low storm water interceptor wall and drain inlet (DI) on 1921 ECDLL near elevation 124 feet. SC-10 is included in this Report only for analysis purposes; the proposed project includes no structural development or change in storm water volume

²⁰ Figure 1 does not depict the sub-catchments within the ECDLL right-of-way or subterranean Sub-Catchment 16, below the residential reuse structural development envelope on the parcel at 1925 ECDLL.

discharge to it - subareas of the parcels at 1917 and 1919 ECDLL also discharge storm water to the existing 1921 ECDLL driveway storm drain;

(h) Sub-Catchment 11 (465 ft²) consists of the proposed upper west side yard, between elevations 95-130 feet, of the project - SC-11 will drain to WST-3, which is located on 1925 ECDLL within the lower house level patio (SC-15);

(i) Sub-Catchment 12 (363 ft²) consists of the proposed upper east side-yard, between elevations 95-120 feet, of the project - SC-12 will drain to WST-3;

(j) Sub-Catchment 13 (1,245 ft²) consists of the proposed north-sloping house entry/foyer roof, foyer deck, and garage roof, which will drain to WST 2;

(k) Sub-Catchment 14 (945 ft²) consists of the south-sloping house roof (with solar panels and outboard planters), which will drain to WST 3;

(l) Sub-Catchment 15 (461 ft²) consists of the lower house level patio, lower level terrace and stairs to the patio, and in-ground WST 3 (available for use as a lap pool) - the impervious patio surfaces will drain to WST 3;

(m) Sub-Catchment 16 consists of the Monterey Formation beneath the proposed replacement house, which will be drained by the three horizontal subgrade drains shown, on Figure 1, as north-south blue lines beneath, respectively, SC's 11/17, SC's 15, 14, 13, 8 and 5, and SC's 15, 14, 13, 8, and 7 - the horizontal drains will discharge to WST 3;

(n) Sub-Catchment 17 (1,516 ft²) consists of the lower west and east side yards of the house (downslope of elevation 95 feet), and of the lower private open space (restored temporary tieback construction bench) - SC-17 drains by cobble flow lines to the horticultural mitigation area in the adjacent restored downslope SC-18;

(o) Sub-Catchment 18 (590 ft²) consists of the restored toe of City (1978) landslide debris cover grading (fill) and this restored area will provide, in response to a City staff preliminary review team comment (2013), the primary on-site horticultural lemonade berry mitigation area (WRA, 2015) - cobble flow lines will both non-erosively discharge runoff to establish/sustain the lemonade berry mitigation shrubs in SC-18 and extend to the adjacent edge of SC-19 to support the sustainability of the existing contiguous lemonade berry vegetation;

(p) Sub-Catchment 19 (6,361 ft²) consists of the existing (1978 repositioned and subsequently matured) contiguous lemonade berry vegetation on the parcel

and the proposed project includes (1) extending the cobble storm water flow lines in SC-18 to near the landward (northerly) edge of SC-19 for continued lemonade berry shrub sustainability, (2) providing additional diffused storm water increments to the SC-18/SC-19 edge by gravity flow from the water storage tanks during storms greater than the City's design 25-year/24-hour rain event, and (3) installing earthen berms across the re-vegetating/closing surveyor's path (2005) to prevent discharges of concentrated runoff from it to the coastal bluff in SC-20;

(q) Sub-Catchment 20 (1,658 ft²) consists of the distinct coastal bluff in Monterey Formation between elevations 11-12 feet and 52 feet, locally with 1978 landslide earthen materials that have been colonized by coastal bluff scrub vegetation (WRA, 2012, 2015) and the project proposes minor in-situ restoration measures (WRA, 2015) where homeless/transient use has accelerated rilling erosion on the coastal bluff, including to impede/discourage any such future use - the project proposes no coastal bluff drain pipes, seawall, or other structures in SC-20; and

(r) Sub-Catchment 21 (2,110 ft²) consists of the Monterey Formation bedrock back beach area of the parcel, which is persistently overlain by a cobble field and seasonally, by a thin (1-2 feet) layer of littoral beach sand - the proposed project includes no drainpipes, seawall, or other structures along or on SC-21.

4.4 Quantitative Storm Water Runoff Volume/Duration Analysis

In accordance with City drainage design criteria (City BMP Guidance Manual Appendix C, BMP sizing methodologies, South Coast), our hydrology analysis was conducted using the computer program HydroCAD to perform the runoff calculations. We incorporated the Santa Barbara Urban Hydrograph (SBUH) method, which includes a Soil Conservation Service (SCS) 24-hour, Type I rainfall distribution, Antecedent Moisture Condition AMC II, 0.10 hour (6-minute) hydrograph ordinate time increments, and 24-hour rainfall interval for the following events: 1-year (1.00 inches in 24 hours), 2-year (3.20 inches in 24 hours), 5-year (4.61 inches in 24 hours), 10-year (5.55 inches in 24 hours) and 25-year (6.71 inches in 24 hours). We assigned the hydrologic soil group designation "A" for the project site based on our review of the soil types present in this area (City BMP Manual Appendix B, Figure 1). Curve numbers for hydrologic soil groups are based on Table 2-2a from the USDA Urban Hydrology for Small Watersheds publication TR-55. In Table 1 below, we present a summary of Sub-Catchments, their respective descriptions, areas, curve numbers, flow lengths (where applicable), slopes (where applicable) and collection devices.

Table 1 – Summary of Sub-Catchments at Post Project Completion

Sub-catchment	Description	Area (ft²)	Curve Number	Flow Length (ft)	Slope (ft/ft)	Collection Device
3	(E) Upper Driveway	1,029	98	100.0	0.0300	(N) Drain Inlet 3P
4	(E) Lower Driveway and (E) 1927 ECDLL garage	1,201	98	80.0	0.1200	(N) Trench Drain 4P
5	Upper Private Open Space	884	68	30.0	0.1000	(N) Drain Inlet 5P
6	(N) Widened 1925 ECDLL Driveway, w/ (N) restored east side-yard	1,340 275	68 98	160.0	0.0700	(N) Drain Inlet 6P
7	(N) Lower Driveway	653	98	30.0	0.1600	(N) Trench Drain 7P
8	(N) Garage Entry Driveway, Turnaround	958	98	30.0	0.0800	(N) Trench Drain 8P
11	(N) West Sideyard (upslope from 97 ft)	433 232	98 68	78.0	0.4300	(N) Drain Inlet 11P
12	(N) East Sideyard (upslope from 97 ft), w/ steps from garage entry driveway	182 181	68 98	65.0	0.3600	(N) Drain Inlet 12P
13	(N) House Entry Foyer Roof, Foyer Deck, Garage Roof	1,245	98	1.0	NA	(N) Drain Inlet 13P
14	(N) House Roof with solar collectors, East/West Side Planters, Lower House Level Stairs Planters	945	98	1.0	NA	(N) Drain Inlet 14P

15	(N) Lower Patio, with Stairs from Lower House Level	461	98	1.0	NA	(N) Drain Inlet 15P
16	(N) Subgrade Horizontal Drains	NA	NA	NA	NA	(N) Collector Pipe
17	(N) Lower West and East Side-yards, Steps from Lower level patio to east Side-yard, Lower Private Open Space	1,365 151	68 98	50.0	0.2400	(N) Cobble-Lined Flow Lines (to SC-18)
18	(N) Horticultural Lemonade Berry Mitigation Area	590	35	25.0	0.2400	(N) Cobble-Lined Flow Lines (in-situ to ground and to SC-19); (N) Energy-Dissipated Outfalls from Cobble- Lined Flow Lines in SC-18, in-situ to Ground.
19	(E) Contiguous Lemonade Berry Vegetation/Open Space Easement	6,361	35	130.0	0.2300	(N) From earthen water bars in surveyor's path (2005) to ground. (E) Direct to ground. (E) Below 54-56 feet, to ground, coastal bluff, and relict 1921 ECDLL swale.
20	(E) Coastal Bluff/Open Space Easement	1658	48	35.0	1.0000	In-situ to ground and along coastal bluff face/rills to the Back Beach.
21	(E) Back Beach	1694 416	83 98	35.0	0.2100	In-situ when littoral beach sand is present; generally along cobbles to Santa Barbara Channel receiving water

4.5 Water Quality Protection and Enhancement Analysis Methodology

As an integral part of this hydrology analysis, CSA has reviewed and specifically applied site-feasible water quality protection and enhancement criteria as provided by the City and CCC, respectively, in the Guidance Manual, certified LCP, and CCC development regulatory special conditions (see Section 2, above).

CSA notes that the proposed project includes (a) conservation and/or restoration in open space 67% of the parcel area and (b) protection of the coastal bluff and contiguous lemonade berry.

Retention and enhancement of the berm in the upper joint 1925-1927 ECDLL driveway, widened 1925 ECDLL driveway, and adjacent side-yard will further function to exclude potentially polluted water in the City ECDLL municipal storm drain from discharging to, and again saturating, the parcel. Trash/debris screening at drain inlets and trench drains, inside storage of garbage containers, bio-filtration in restored native vegetation areas, regular driveway/gutter sweeping, storm water management system maintenance to remove sediment and for other O/M purposes, and UVL water treatment will afford substantial water quality protections and enhancements as integral components and functions of the project.

As noted above, the combined need to avoid high pore water pressures in the residential reuse development envelope and the dip-slope Monterey Formation bedding plane condition on the parcel preclude general (parcel-wide) infiltration of storm water generated during the City design storm events to ground. However, as discussed above, the proposed project includes discharging controlled storm water to establish and sustain the horticultural lemonade berry mitigation shrubs in SC-18, and to sustain the contiguous lemonade berry vegetation in SC-19. These shrubs will, in turn, enhance in-situ runoff water quality through volumetric reduction (by discharge to ground, plant uptake, and evapotranspiration), ground stabilization, and reduced (avoided) erosion and entrainment of sediment.

Table 2 – Summary of Post-Project Completion Drainage Collection Devices

Device	Description	Elevation (feet)		Discharges to Device
		Top (of Grate)	Invert	
1P	(N) Replacement Curb with SWMS excess water outfalls	Varies	Varies	ECDLL municipal storm drain
2P	(N) 8-inch high berm along east side of widened driveway side-yard	Varies	Varies	Drain Inlet (DI) 6P
3P	(N) Drain Inlet at SE base of (E) Upper Driveway	137.0	135.0	Drain Junction Box 4.5 P

4P	(N) Trench Drain across base of (E) Lower Driveway	130.5	128.5	Drain Junction Box 4.5 P
5P	(N) Drain Inlet in SE arc of (N) Upper Private open Space	129.0	127.0	Water Storage Tank (WST) 2
6P	(N) Drain Inlet at Base of (N) Widened Driveway	130.5	128.5	WST 1
7P	(N) Trench Drain across base of (N) Lower Driveway	123.5	121.5	WST 2
8P	(N) Trench Drain across base of (N) Garage Entry Driveway	121.5	119.5	WST 2
11P	(N) Drain Inlet at base of west Side-yard upslope from 97 ft	97.0	95.1	WST 3
12P	(N) Drain Inlet at base of east Side-yard upslope from 97 ft	97.0	95.1	WST 3
13P	(N) Drain Inlet for House Foyer Roof, Foyer Deck, and Garage Roof	As Designed	As Designed	WST 2
14P	(N) Drain Inlet for House Roof, w/Solar Collectors and East/West Planters	As Designed	As Designed	WST-3
15P	(N) Drain Inlet for Lower Patio, Lower House Steps	95.0	95.1	WST-3
16P	(N) Collector Pipe for Horizontal Drains	Varies	Varies	WST-3
17P	(N) Cobble-lined 1925 ECDLL Lower Side Yard Flow Lines	As Designed	As Designed	Cobble-lined Flow Lines on SC-18
18P	(N) Cobble-lined Flow Lines	As Designed	As Designed	Outfalls (typ.) 1, 2, 3, 4 on SC-18
19P	Multi-Port Excess Storm Water Outfall along SC-18/SC-19 Boundary, with Energy Dissipators	As Designed	As Designed	Sub-catchment 19, for (E) Lemonade Berry Shrub Sustainability

WST-1	Water Storage Tank below lower SC-6	In-invert: 127.5	Out-invert: 127.0	Priority sequence: 1. WST-2; 2. WST-3; 3. SC-19; 4. City ECDLL Cistern (if available); 5. ECDLL Municipal Storm Drain
WST-2	Water Storage Tank below SC-8	In-invert: 118.5	Out-invert: 117.5	Priority sequence: 1. For Non-potable Reuse in the Replacement House; 2. WST-3; 3. SC-19; 4. City ECDLL Cistern (if available); 5. ECDLL Municipal Storm Drain
WST-3	Water Storage Tank below SC-15	In-invert: 95.0	Out-invert: 95.0	Priority sequence: 1. WST-1; 2. SC-19; 3. City ECDLL Cistern (if available); 4. ECDLL Municipal Storm Drain

5.0 PRE-1978 ECDLL LANDSLIDE AND CURRENT (2015) DRAINAGE CONDITIONS

In this section, we characterize drainage of the parcel (1) during developed conditions prior to the 1978 ECDLL landslide (in sub-section 5.1), and (2) under currently (2015) developed conditions (in sub-section 5.2). As the terms “developed” or “development” apply to this parcel in the coastal zone pursuant to California Coastal Act Section 30106, they include structures and grading.

5.1 Pre-1978 ECDLL Landslide Drainage Conditions

In this part of the Hydrology Report, we characterize the conditions of the parcel and adjacent tributary terrain prior to the February 11-14, 1978 “ECDLL landslide”. CSA’s Geological and Geotechnical Investigation Report (2012) and Supplemental Report (2015), WRA’s Biological Reconnaissance Report (2012), GSI’s Wave Runup/Coastal Hazards Report (2012) and Report Update (2015), the Preliminary Project Consistency Analysis (Dall & Associates, 2013), and the Project Constraints/Consistency Analysis (Dall & Associates, 2015) describe and document the relevant conditions of the parcel, and as applicable, within the sub-watershed in which it is located. CSA has utilized the City’s 1965 aerial topographic survey map [with a Mean Sea Level (MSL) datum] to serve as the base map for illustrating the respective drainage areas on the parcel prior to the 1978 ECDLL landslide.

CSA has identified the following subareas (from north to south) that contributed, or likely contributed, storm water runoff to the parcel prior to and through the February 13, 1978 rain storm that preceded the catastrophic 1978 ECDLL Landslide at or about 2300 hours on February 14, 1978:

5.1.1 West Mesa Neighborhood

Storm water from the West Mesa neighborhood upslope of the Oliver Road-ECDLL intersection drained, in part, easterly along paved (AC) ECDLL, which also received runoff from abutting parcels. The ECDLL municipal storm drain discharged to a drain inlet in the ECDLL cul-de-sac, and thence to the City's West Mesa "Lighthouse Creek" storm runoff conveyance. The combination of a low curb along the south side of ECDLL with impervious and semi-pervious, downward sloping, driveway pavement on the parcels at 2001 ECDLL through 1903 ECDLL allowed and directed water in ECDLL during the 1977-1978 Rain Year (prior to February 15, 1978) to discharge along these driveways to pre-modern (pre-historic mapping) landslide terrain at 2001, 1933-1937, 1927, 1925, 1921, and 1909 ECDLL.

5.1.2 Joint 1925-1927 ECDLL Upper Driveway Area

The oblique linear feature from 1929 ECDLL across the head of the combined 1925-1927 ECDLL driveway pavement prior to the 1978 landslide may be interpreted to be a small (± 2 feet wide) drainage swale (depression) that directed storm water from the front yard at 1929 ECDLL to the 1921 ECDLL driveway. Prior to the 1978 ECDLL landslide, terrain in the east side yard and south rear yard at 1929 ECDLL drained both toward the 1925-1927 ECDLL driveway and the garage driveway apron at 1927 ECDLL. It, in turn, drained both (a) across the 1925 ECDLL side-yard east of the joint driveway toward the 1921 ECDLL driveway and (b) to/along the lower 1925 ECDLL driveway.

5.1.3 Sub-Catchment SC-PRE 1, 1925 ECDLL Lower Driveway, Turnaround, and Property Line Drainage Ditch

The lower driveway and adjacent carport turnaround pavement at 1925 ECDLL are shown as SC PRE-1, 2,084 square feet, on Figure 2, the Pre-Landslide Drainage Map. The driveway pavement on 1925 ECDLL and its tributary areas on 1927 ECDLL and 1929 ECDLL drained to the head of a south-trending drainage ditch that began off the NE corner of the carport at 1925 ECDLL and continued downslope along the 1921-1925 ECDLL property line to near elevation 95-100 feet MSL feet. Drainage from 1917 ECDLL, 1919 ECDLL, and 1921 ECDLL collected in the 1921 ECDLL driveway and also discharged to near the head of that drainage ditch. Below 95 feet MSL, the ditch widened, received additional drainage from easterly 1919 ECDLL, 1921 ECDLL, 1925 ECDLL, and 1909 ECDLL, and extended downslope on westerly 1921 ECDLL to its debouchment over the coastal bluff, locally with rilling, to the back beach. Concrete

decking on the north side of the upper level of the split-level two-story house at 1925 ECDLL drained to the head of the concrete stairs in its west side yard, and then downslope along the continuing improved path to the base of the manufactured slope, below the graded building pad of the lower level of the house.

5.1.4 Sub-Catchment SC-PRE 2, 1925 ECDLL Split-Level House, Carport, and Lower Patio

In SC-PRE 2, 2,086 square feet, the westerly half of the house roof at 1925 ECDLL drained to the west side yard and thence downslope along SC-PRE 4a. The easterly half of the house roof and the carport roof drained to the drainage ditch, partly within SC-PRE 4b, 353 square feet, along the east property line. The concrete patio and walkway along the south-facing lower level of the house drained to an oblique, southwest trending, stairway on the vegetated manufactured slope below the house, and from it to the base of the slope along the SC-PRE 2 boundary with SC-PRE 3.

5.1.5 Sub-Catchment SC-PRE 3, Vegetated-Manufactured Slope Below the House

SC-PRE 3, 1,858 square feet, the manufactured slope below the house, drained east-southeast to the drainage ditch on westerly 1921 ECDLL. In October 1972, horticultural pink ice plant occurred on this slope to, in parts successfully, remediate surficial erosion.

5.1.6 Sub-Catchment SC-PRE 4, Side-Yards

SC-PRE 4a, 335 ft², consists of the west side yard and westerly edge of the manufactured slope below the house. SC-PRE 4b, 353 ft², consists of the east side yard, easterly edge of the manufactured slope, and west bank of the drainage ditch along the 1921-1925 ECDLL property line. The west side yard drained along the hillside concrete steps and path to SC-PRE 5. The east side yard drained to the drainage ditch.

5.1.7 Sub-Catchment SC-PRE 5, Upper Hillside Yard

SC-PRE 5, 1,338 ft², the upper hillside yard with three horticultural lemonade berry shrubs for local erosion control (1972, 1975), drained east-southeast to the drainage ditch/swale on westerly 1921 ECDLL.

5.1.8 Sub-Catchment SC-PRE 6, Main Hillside Yard

The main hillside yard on 1925 ECDLL, shown as SC-PRE 6, 6,750 square feet, on Figure 2, extended between the east-west fence (and gate) near elevation 50 feet MSL and $\pm 92-93$ feet MSL. This area generally drained east-southeast to the drainage ditch/swale on westerly 1921 ECDLL; however, the south-southeast trending diagonal

path on this pre-1978 landslide Sub-catchment drained to the head of the beach access path (estimated to be 4-feet wide) that was excavated in the distinct Monterey Formation coastal bluff, discussed below with regard to SC-PRE 7. The area immediately north of the east-west fence line drained to and down the coastal bluff, where it supported colonizing vegetation (1972, 1975).²¹

5.1.9 Sub-Catchment SC-PRE 7, Coastal Bluff

The California coastal program “coastal bluff” on 1925 ECDLL, SC-PRE 7, 2,868 square feet, extended in exposed Monterey Formation between elevations ± 10 feet MSL (1972, 1975) and ± 50 feet MSL.²² Prior to the 1978 landslide, an excavated 4-feet wide beach access path descended from a gate, in the east-west fence at easterly 1925 ECDLL, by a zig-zag pattern on 1925-1927 ECDLL from near the upper termination (edge) of the coastal bluff (Scepan, 2012) to its base at the back beach. The State Lands Commission (1961) surveyed the base (toe) of the coastal bluff at/near elevation 10 feet (NGVD29); comparison of 1962 and 1975 vertical aerial photographic imagery indicates that both the base and upper termination of the coastal bluff remained substantially unchanged during that period. Prior to the 1978 ECDLL landslide, the coastal bluff drained both along the excavated beach access path segments and downslope along the coastal bluff face, as indicated by colonizing (colonized) coastal bluff vegetation (1972, 1975).

5.1.10 Sub-Catchment SC-PRE 8, Back Beach Area

The back beach area on 1925 ECDLL, SC-PRE 8, 1,093 square feet between the SLC-surveyed base of coastal bluff and the MHTL, consisted prior to the 1978 ECDLL landslide (1962, 1970, 1972, 1975) of a sand and cobble surface. In-situ drainage was through the beach sand, when present, to the cobbles, and thence over them and the underlying Monterey Formation seaward to the near-shore waters of the Santa Barbara Channel of the Pacific Ocean.

²¹ Scepan (2012) interpreted 1950, 1962, 1970, and 1975 vertical aerial photographic imagery of the area of the parcel to identify the upper termination of the pre-1978 landslide (e.g., 1950) coastal bluff, pursuant to the location criteria set forth in Title 14, California Code of Regulations section 13577(h), immediately south of (below) that east-west fence line.

²² We note that the City’s 1965 topographic map depicts closely spaced 5-foot interval elevation contour lines, indicative of a steep slope between elevations 25 feet MSL and 50 feet MSL on 1921 ECDLL, the parcel adjacent to the east property line of 1925 ECDLL. The California State Lands Commission (SLC, 1961) surveyed the toe of the coastal bluff at 1921 and 1925 ECDLL at 10 feet NGVD29.

5.2 Current (2014-2015) Drainage Conditions

Current (Spring, 2015) drainage conditions on the parcel reflect the cumulative effects of (a) grading and structural development for the MTLs, split-level two-story house and appurtenances (1946-1978), (b) the February 11-14, 1978 ECDLL landslide, (c) subsequent grading, hydro-modification, and repositioning or planting of horticultural vegetation, (d) marine and coastal atmospheric processes on the substantially reestablished geometry of the back beach and coastal bluff areas, (e) (re)colonization by native coastal bluff scrub species of the coastal bluff face, and (f) locally accelerated rilling erosion by recent utilization of the coastal bluff by transients to access a homeless encampment in the dense vegetation on the immediate coastal bluff top. The parcel contains no perennial, intermittent or ephemeral stream(s) (WRA, 2012, 2015). A small (± 12 feet long, 18-inches wide) concrete V-ditch drains the lower joint 1925-1927 ECDLL concrete driveway to the 1921 ECDLL driveway. Higher high ocean tides intermittently, and super-elevated ocean (storm) water episodically, run up on, or inundate, the cobble-sand back beach area of the parcel (Skelly/GeoSoils, 2012, 2015). Wave runup associated with El Niño/Southern Oscillation storm events controls the long-term location of the base (toe) of the coastal bluff (Skelly/GeoSoils, 2012).

In sub-sections 5.2.1 through 5.2.16, below, we characterize each of the current (2015) Sub-Catchments of the parcel, from north to south. These Sub-Catchments are denoted as "SC-3", "SC-4", etc., to distinguish them from the pre-1978 landslide Sub-Catchments ("SC-PRE 3", etc.). The areas (boundaries) of the current and proposed post-project completion Sub-Catchments (addressed in Section 7, below) are the same. Figure 3, the "Current Conditions Drainage Map," thus serves to depict both the current and post-project completion locations of these Sub-Catchments.

In Section 7, we summarize our quantitative analysis of storm water runoff from the current (2015) sub-catchments during the City design storm events.

5.2.1 Sub-Catchment SC-3, Upper Joint 1925-1927 ECDLL Driveway Pavement

SC-3, 1,029 square feet (100% impervious surfaces), consists (2015) of the joint 1925-1927 ECDLL upper driveway concrete/AC pavement, including the AC pavement berm generally north of elevation 139 feet MLLW. SC-3 drains to the east upper side yard on 1925 ECDLL, and thence to the 1921 ECDLL driveway (Sub-Catchment SC-10).

5.2.2 Sub-Catchment SC-4, Relict Lower 1925 ECDLL Driveway Pavement and Tributary 1927 ECDLL Garage Driveway

SC-4, 1,201 square feet, consists of the concrete/AC joint 1925-1927 ECDLL mid-lower driveway, and the flagstone 1927 ECDLL garage driveway apron. SC-4 drains, in

relevant parts, from 1927 ECDLL to the joint driveway, from the joint driveway to the easterly 1925 ECDLL side yard, and when sandbags are seasonally placed along the east-west fence that bisects the lower joint driveway, by a small concrete V-ditch to the 1921 ECDLL driveway (SC- 10).

5.2.3 Sub-Catchment SC-5, Relict (1956-1978) Carport Driveway, Turnaround, and House Entry Pavement, and City (1978) Upper MTLS Buttress

SC- 5, 884 square feet, consists (1) of the concrete/AC pavement of the relict (1956-1978) carport driveway, turnaround, and house entry areas, north of the ± 131 feet MLLW contour, (2) the City (1978) graded and locally rilling eroded buttress of the MTLS trench and pipe, and (3) an east-west wooden fence, seasonally with stacked sand bags (storm water diversion device) along its north side, near the base of the lower joint driveway pavement. The MTLS trench bisects SC- 5 from west to east between elevations ± 118 feet and 132 feet MLLW, with the sewer pipe located near the bottom of the trench. Along the east-west fence line, seasonally with sandbags along its base, SC- 5 drains to the small concrete v-ditch in the east 1925 ECDLL side yard, and thence to the 1921 ECDLL driveway. South of the east-west fence, SC- 5 drains south across the relict carport driveway, turnaround and house entry pavement (locally with a ≤ 1 feet (v) fill cover), and then south along the City (1978) upper MTLS buttress (locally with rilling erosion, including underneath the southerly edge of the relict pavement).

5.2.4 Sub-Catchment SC-6, Upper East Side Yard

SC-6, 1,615 square feet (located on 1925 ECDLL only), consists (1) of ruderal and horticultural vegetation (WRA, 2012, 2015) in soil and fill, and (2) in parts the east-west fence, seasonal sandbags, and small concrete v-ditch described above. SC- 6 drains to the 1921 ECDLL driveway, SC- 10.

5.2.5 Sub-Catchment SC-7, Carport Driveway, East Side Yard, and Upper City (1978) MTLS Buttress

SC-7, 653 square feet, consists (1) of the concrete/AC pavement of the relict (1956-1978) carport driveway, turnaround, and house entry areas, north of the ± 131 feet MLLW contour, (2) the City (1978) graded and locally rilling eroded buttress of the MTLS trench and pipe, and (3) in part of the east-west wooden fence, seasonally with stacked sand bags (storm water diversion device) along its north side, near the base of the lower joint driveway pavement. SC-7 seasonally drains along the east-west fence line/sandbags to the small concrete v-ditch in the east 1925 ECDLL side yard, and thence to the 1921 ECDLL driveway. South of the east-west fence, SC-5 drains south across the relict carport driveway and easterly edge of the turnaround pavement (locally with a ≤ 1

feet (v) fill cover), and then south along the City (1978) upper MTLS buttress (locally with rilling erosion, including underneath the southerly edge of the relict pavement).

5.2.6 Sub-Catchment SC-8, City (1978) MTLS Buttress

SC-8, 958 square feet, consists of the City (1978) graded and compacted earthen buttress of the MTLS trench and pipe. SC-8 drains south on the City (1978) grading envelope.

5.2.7 Sub-Catchment SC-11, House Entry Pavement, City (1978) MTLS Buttress, City (1978) Excavation/Borrow Grading Area

SC-11, 465 square feet, consists of (1) of the concrete/AC pavement of the relict (1956-1978) house entry areas, north of the ± 131 feet MLLW contour, and (2) the City (1978) graded and locally rilling eroded buttress of the MTLS trench and pipe. SC-11 drains to the south and south-southwest on the City (1978) grading envelope.

5.2.8 Sub-Catchment SC-12, City (1978) MTLS Buttress, City (1978) Excavation/Borrow Grading Area

SC-12, 363 square feet, consists (1) of the City (1978) graded and locally rilling eroded buttress of the MTLS trench and pipe, and (2) of the City (1978) excavation/borrow material area. SC-12 drains to the south on the City (1978) grading envelope.

5.2.9 Sub-Catchment SC-13, City (1978) MTLS Buttress, City (1978) Excavation/Borrow Grading Area

SC-13, 1,245 square feet, consists of the City (1978) excavation/borrow material area. SC-13 drains to the south on the City (1978) grading envelope.

5.2.10 Sub-Catchment SC-14, City (1978) Excavation/Borrow Grading Area, Doolittle (1984) Excavation/Borrow Grading Area

SC-14, 945 square feet, consists (1) of the City (1978) excavation/borrow material area, and (2) the transition slope graded by Doolittle (1984) on the westerly edge [3-12 feet (h)] of the parcel below elevation 93 feet MLLW. SC-14 primarily drains to the south on the City (1978) grading envelope; the westerly transition slope above elevation 54-56 feet drains to the south-southwest onto 1927 ECDLL; and the excavated southwesterly transition slope, between 50-52 feet and 54-56 feet, drains south to the coastal bluff.

5.2.11 Sub-Catchment SC-15, City (1978) Landslide Debris Fill Cover Grading, Doolittle (1984) Excavation/Borrow Grading Area

SC-15, 461 square feet, consists of the landward (northerly) edge of the City (1978) graded landslide debris cover, locally with landslide concrete debris. SC-15 drains to the south along the City (1978) graded landslide debris cover.

5.2.12 Sub-Catchment SC-17, City (1978) Landslide Debris Fill Cover Grading, Doolittle (1984) Excavation/Borrow Grading Area

SC- 17, 1,516 square feet, consists of the City (1978) graded landslide debris cover, locally with landslide concrete debris. SC-15 drains to the south along the graded landslide debris cover to its toe.

5.2.13 Sub-Catchment SC-18, City (1978) Landslide Debris Fill Cover Grading, Doolittle (1984) Excavation/Borrow Grading Area

SC-18, 590 square feet, consists (1) of the lower slope (toe) of the City (1978) graded landslide debris cover, locally with landslide concrete debris, and (2) along its westerly edge [3-12 feet (h)], the Doolittle (1984) excavation/borrow area transition slope. SC-18 drains generally to the south along the graded landslide debris cover to the contiguous (matured, previously City [1978] repositioned) lemonade berry shrubs; in the transition slope, SC-18 drains to the southwest to 1927 ECDLL.

5.2.14 Sub-Catchment SC-19, City (1978) Horticultural Vegetation Repositioned/Matured Lemonade Berry Shrubs, Doolittle (1984) Excavation/Borrow Grading Area

SC-19, 6,361 square feet, consists (1) of the City (1978) repositioned and subsequently matured lemonade berry shrubs, and (2) the Doolittle (1984) excavation/borrow area transition slope on the westerly to 12 feet of the parcel, locally with the re-vegetating (closing) 2005-2006 topographic survey transect path. The contiguous lemonade berry shrub coverage drains primarily south through south-southeast toward the relict lower drainage ditch/swale on westerly 1921 ECDLL. The lemonade berry shrub area below elevation 56 feet MLLW drains generally south to the upper termination of the coastal bluff, except along the area's easterly 15-20 feet, where it also drains to 1921 ECDLL. The Doolittle (1984) excavated transition slope drains to the surveyor's path and thence along it during large rain events to the immediate southwesterly coastal bluff top area, also excavated by Doolittle (1984), and thence along rilling on the coastal bluff (SC-20) and to the back beach (SC-21).

5.2.15 Sub-Catchment SC-20, Current Coastal Bluff Face

SC-20, 1,658 square feet, consist of the surveyed California coastal program (Coastal Commission, City) “coastal bluff”, between elevations 11-12 feet MLLW along its base (toe) and 52 feet MLLW along its upper termination (edge, top) [CSA, 2011; see, also, the photo-imagery of the coastal bluff acquired on March 7, 2015 (Skelly/GSI, 2015)]. Recent (2014-2015) wave runup/splashing and wave spray have exposed the Monterey Formation stratigraphy, locally with relict 1978 landslide material, in five discrete segments along the lower (near-vertical) coastal bluff face, variously between elevations 11-12 feet MLLW along the rear of the back beach cobbles and 15-20 feet MLLW. Rilling erosion, locally accelerated by ingress/egress by homeless persons between the beach and the dense vegetation on the immediate coastal bluff top, has occurred along and above a previously eroding small fracture zone near the 1925-1927 ECDLL property line, and at or along other rills in the vegetation on the coastal bluff face on the parcel. The coastal bluff face receives episodic storm water runoff (overland flow) from the lower 1984 grading envelope on the parcel, and by the closing (re-vegetation) 2005-2006 surveyor’s path that meanders near the 1925-1927 ECDLL property line between elevations 56-70 feet MLLW. Drainage on the coastal bluff face occurs downslope along the near vertical and southeast trending rills. CSA has observed (2008-2015) no seepage, or typically associated mineralization, in the coastal bluff face. Mobilization along the rear of the back beach of small cobbles during episodic super-elevated water conditions (storm waves on top of higher high tides) appears to result in the localized abrasion {recurrent minor [1-2 feet (h) and (v)] horizontal cave formation} of material along the toe of the coastal bluff on the parcel (e.g., in GSI’s Exhibit B1, location #3). Drainage from the lower coastal bluff is to the adjacent cobble-sand back beach.

5.2.16 Sub-Catchment SC-21, Current Back Beach Parcel Area

SC-21, 2,110 square feet, extends between the Mean High Tide Line and the toe (base) of the coastal bluff. The back beach area of the parcel consists of erosion-resistant Monterey Formation bedding planes (slabs), overlain by a long-term persistent (pre-1978) cobble field, and seasonally further overlain by a thin veneer (0.5 to 2.0 feet (v)) of littoral beach sand. SC- 21 drains, when beach sand is present, to the underlying cobble field and along the Monterey Formation slabs to the receiving waters of the near-shore Santa Barbara Channel. During “winter” beach conditions, when the beach sand is partly or completely eroded, this area drains over and between the cobbles to the Channel.

5.2.17 Sub-Catchment SC-10, Current 1921 ECDLL Driveway Drainage

SC-10, 3,599 square feet, consists of (1) the easterly side yard of 1921 ECDLL, planted with horticultural vegetation where it abuts the houses and small westerly yards

on adjacent 1917 ECDLL and 1919 ECDLL, (2) the western side yard of 1921 ECDLL, that supports ruderal vegetation, both in-ground and potted horticultural vegetation, and the small concrete V-ditch that discharges storm water runoff from the existing lower joint 1925-1927 ECDLL driveway to the 1921 ECDLL driveway, and (3) the concrete/asphalt concrete pavement of the 1921 ECDLL driveway, including its post-1978 crown north of elevation 139 feet MLLW to exclude storm water in the ECDLL municipal form drain from discharging to this driveway, and the connecting 1919 ECDLL garage apron driveway.²³ Both easterly and westerly side yards, as well as the 1919 ECDLL westerly garage apron driveway, drain to the 1921 ECDLL driveway pavement. It, in turn, discharges at the base of a driveway-perpendicular low concrete wall to a 6-inch diameter corrugated plastic drainpipe that extends downslope to the south-southeast on 1921 ECDLL.

6.0 POST-PROJECT COMPLETION DRAINAGE CONDITIONS

In this Section, we describe proposed drainage conditions for the parcel at completion of the proposed residential reuse, conservation, and restoration project. Unless otherwise noted, all referenced structural storm water management BMPs constitute new (proposed) SWMS components. Figure 1 illustrates the respective locations of the Sub-Catchments referenced herein.

6.1 Sub-Catchment SC-3, Upper Joint 1925-1927 ECDLL Driveway Pavement

SC-3, 1,029 square feet, will consist of the joint 1925-1927 ECDLL upper driveway pavement, including the pavement berm generally north of elevation 139 feet MLLW. The Project proposes to utilize flagstone or similar pavers as the surface for the new (widened) and repaved driveway on 1925 ECDLL.²⁴ SC-3 will drain to Drain Inlet (DI) 3P and to the 1921 ECDLL driveway (Sub-Catchment SC-10).

6.2 Sub-Catchment SC-4, Lower 1925 ECDLL Driveway Pavement and Tributary 1927 ECDLL Garage Driveway

SC-4, 1,201 ft², will consist of the joint 1925-1927 ECDLL mid-lower driveway, and the existing flagstone 1927 ECDLL garage driveway apron. SC-4 will drain, in relevant parts, from 1927 ECDLL to the joint driveway, thence to Trench Drain 4P at the

²³ Ingress to and egress from 1919 ECDLL to the street is by a driveway easement on the 1921 ECDLL driveway. A \pm 45-foot long (north-south trending) retaining wall currently adjoins the westerly edge of the 1921 ECDLL driveway between elevation +129-135 feet.

²⁴ The Project will be coordinated with the separate legal owner of 1927 ECDLL regarding matching re-pavement with flagstone or similar pavers of the joint driveway on that parcel.

southerly end of the joint driveway at the SC-5/SC-5 boundary to the 1921 ECDLL driveway (SC-10). To prevent storm water runoff from SC-4 to the adjacent restored private open space area, Trench Drain 4P will be bermed along its south edge on SC-5, between the existing 1925-1927 ECDLL yard fence/retaining wall on the west and the proposed westerly retaining wall of the new driveway segment in SC-7.

6.3 Sub-Catchment SC-5, Restored Upper Private Open Space

SC-5, 884 ft², will be restored through removal of relict concrete decking, restoration grading, and planting/installation of the proposed upper private open space area (with low stature native vegetation). SC-5 will drain to DI 5, located in the southeasterly arc of the Sub-Catchment, and thence to WST-2. The new westerly driveway retaining wall in SC-7 curves around the base of SC-5 to separate it from the adjacent turnaround pavement in SC-8. The proposed gate in the retaining wall for access from the turnaround to the private patio will be constructed and maintained to be self-closing and watertight.

6.4 Sub-Catchment SC-6, Widened 1925 ECDLL Upper Driveway and Upper East Side Yard

SC- 6, 1,615 ft²,²⁵ will consist of the widened driveway on 1925 ECDLL (1,340 ft² paved, to meet City development standards) and the adjacent east side yard (275 ft²). The proposed Project includes utilization of flagstone or similar pavers as the driveway surface. The side yard will be restored with low stature native vegetation, and a combination low (8-inch high) berm and driveway easterly retaining wall to prevent overland flow (runoff) from SC-6 to the 1921 ECDLL driveway (SC-10). SC-6 will drain to Drain Inlet 6P, and thence to WST-1.

6.5 Sub-Catchment SC-7, New Lower 1925 ECDLL Driveway

SC-7, 653 ft², will consist of the new lower driveway on 1925 ECDLL.²⁶ The Project proposes to utilize flagstone or similar pavers as the driveway surface. The westerly and easterly driveway retaining walls will function to maintain storm water runoff within this Sub-catchment. SC-7 will drain to Trench Drain 7P, and thence to WST-2.

²⁵ The proposed Project includes, pursuant to an offer of a driveway easement from the Luz Trust, owner of 1921 ECDLL, to locate approximately 275 ft² of the widened driveway in SC-6 within that easement.

²⁶ The proposed Project includes, pursuant to an offer of a driveway easement from the Luz Trust, owner of 1921 ECDLL, to locate approximately 125 ft² of the widened driveway in SC-7 on that easement.

6.6 Sub-Catchment SC-8, New Garage Entry Driveway and Turnaround

SC-8, 958 ft², will consist of the new garage entry driveway and turnaround area, both with flagstone driveway surfacing. The proposed gate in the retaining wall for access from the garage entry driveway to the steps in SC-12 to the west side yard will be constructed and maintained to be self-closing and watertight. SC-8 will drain to Trench Drain 8P, and thence to WST-2. WST-2 will be located below the turnaround and garage driveway pavement, adjacent (north of) the subsurface upper row of shear-pins.

6.7 Sub-Catchment SC-11, Upper West Side-Yard

SC-11, 465ft², will be restored as the west side yard, with restoration grading, installation of the subsurface westerly shear pin(s), a cobble-lined storm water flow path, a walkway that extends downslope from the upper private open space access steps, and low stature native vegetation. SC-11 will drain to DI 11P, and thence to WST-3.

6.8 Sub-Catchment SC-12, Upper East Side-Yard

SC-12, 363 ft², will be restored as the east side yard, with restoration grading, installation of the subsurface easterly shear pin(s), a cobble-lined storm water flow path, steps from SC-8, a walkway that extends downslope, and low stature native vegetation. SC-12 will drain to DI 12, and thence to WST-3.

6.9 Sub-Catchment SC-13, North-Sloping House Entry and Garage Roof, and Entry Deck

SC-13, 1,245 ft², will consist of the north-sloping roof of the house entry, garage, and house entry deck. SC-13 will drain to collector DI 13, and thence to WST-2.

6.10 Sub-Catchment SC-14, South-Sloping House Roof, with Planters

SC-14, 945 ft², will consist of the south-sloping house roof, with west and east perimeter planters. SC-14 will drain to collector DI-14, and thence to WST-3.

6.11 Sub-Catchment SC-15, Lower House Level Patio, with Steps and Lap Pool

SC-15, 461 ft², will consist of the patio, with connecting steps to the lower level of the house. SC-15 will drain to DI-15, and thence to WST-3, which will function as a double-lined lap pool in the lower patio. WST-3 will be located north of (adjacent to) the lower row of shear-pins.

6.12 Sub-Catchment SC-16, Subsurface Horizontal Drains

SC-16 consists of three horizontal (2nd) drains, respectively in (beneath) SC's 11/17, SC's 5/8/13/14/15, and SC's 7, 12, and 17. The horizontal drains, designed to intercept groundwater below/near the proposed residential reuse development envelope, will discharge to Collector Drain (CD) 16P, and thence to WST-3.

6.13 Sub-Catchment SC-17, New Lower Private Open Space and Lower Side-Yards

SC-17, 1,516 ft², will consist of (1) the restored temporary tieback installation construction bench as the Project lower private open space, with cobble-lined flow lines, a walkway that connects the west and east side yards, and native vegetation plantings, and (2) the continuation of the upper west and east side yard restoration and improvement measures described with regard to SC-11 and SC-12. Steps will connect the east side of the lower patio (SC-15) with the lower east side yard in SC-17. SC-17 will drain by cobble-lined flow lines to the horticultural lemonade berry mitigation area (SC-18), for its establishment and sustainability.

6.14 Sub-Catchment SC-18, Horticultural Lemonade Berry Mitigation Area

SC-18, 590 ft², will consist of the restored toe of City (1978) grading, to facilitate the on-site mitigation (planting) area for horticultural lemonade berry shrubs that currently occur within the proposed residential redevelopment area. SC-18 will receive and locally continue the cobble-lined flow lines from SC-17, for non-erosive distribution of storm water to the lemonade berry mitigation shrubs. Subsurface piping in SC-18 will discharge excess storm water from the WST's through outfalls, with energy dissipaters, located along the SC-18/SC-19 boundary to support sustainability of the existing contiguous lemonade berry shrubs on the parcel.

6.15 Sub-Catchment SC-19, Existing Contiguous Lemonade Berry Shrubs

SC-19, 6,361 ft², will consist of the proposed open space easement-protected contiguous lemonade berry shrubs on the parcel, including restoration measures (earthen water-bars) in the re-vegetating/closing surveyor's path (2005-2006) to prevent discharge of concentrated storm water runoff along that path from contributing to rilling erosion of the coastal bluff. SC-19 drains *in-situ* to ground (the root zone of the deep-rooted lemonade berry shrubs). The proposed restoration measures along the surveyor's path will beneficially contribute to coastal bluff face stability.

6.16 Sub-Catchment SC-20, Coastal Bluff

SC-20, 1,658 ft², will consist of the proposed open space easement-protected coastal bluff, including prohibition of erosive and plant-destructive trespass use by

homeless that presently camp in the contiguous lemonade berry shrubs on the immediate coastal bluff top. SC-20 drains *in-situ* along rills to soil pockets colonized by coastal bluff scrub vegetation, and generally downslope to the back beach.

6.17 Sub-Catchment SC-21, Back Beach Area

SC-21, 2,110 ft², will consist of the proposed lateral public access easement between the toe (base) of the coastal bluff and the MHTL. SC-21 drains *in-situ* through littoral beach sand, when it is present, to and along the underlying cobbles and Monterey Formation bedrock to the near-shore waters of the Santa Barbara Channel of the Pacific Ocean.

6.18 Sub-Catchment SC-10, 1921 ECDLL Driveway

SC-10, 3,599 ft², consists of the following drainage areas on 1921 ECDLL: (1) The easterly side yard, planted with horticultural vegetation where it abuts the houses and small westerly yards on adjacent 1917 ECDLL and 1919 ECDLL, which are not affected by the Project. (2) The western side yard of 1921 ECDLL, that variously supports ruderal vegetation, both in-ground and potted horticultural vegetation, and the small concrete v-ditch that discharges storm water runoff from the existing lower joint 1925-1927 ECDLL driveway to the 1921 ECDLL driveway. As shown on Figure 1, the Post-Project Completion Drainage Map, a 100 feet long (north-south) by 4-5 feet wide polygon of this side yard will be included as part of the new (in parts widened) 1925 ECDLL driveway, pursuant to an offer by the Luz Trust (owner of 1921 ECDLL) to grant a driveway and drainage easement over this area to 1925 ECDLL.

The proposed Project includes replacing the existing at-grade concrete V-ditch with a subsurface drain pipe that will continue to discharge storm water runoff from SC-3 and SC-4 through an outfall at the grade of the existing 1921 ECDLL driveway in essentially the same location as the present V-ditch. The concrete/asphalt concrete pavement of the 1921 ECDLL driveway, including its post-1978 berm north of elevation 139 feet MLLW functions to exclude storm water in the ECDLL municipal form drain from discharging to this driveway. The proposed Project includes the interception and retention on-site storm water runoff from the easterly 1925 ECDLL side yard, which presently also drains by overland flow (sheet flow) to SC-10. Both easterly and westerly side yards adjacent to the 1921 driveway, as well as the westerly garage apron driveway on 1919 ECDLL, will continue to drain to the 1921 ECDLL driveway pavement. It, in turn, discharges at the base of a driveway-perpendicular low concrete wall to a 6-inch diameter corrugated plastic drainpipe that extends downslope to the south-southeast on 1921 ECDLL.

7.0 RESULTS OF HYDROLOGY ANALYSIS

In this section, we present the results of our quantitative hydrology analysis of storm water runoff generated at the parcel during the range of 24-hour City design rain storm events with a recurrence of two, five, ten, and twenty-five years. In Section 7.1, we discuss our analysis of these storm events during developed drainage conditions at the parcel prior to the 1978 ECDLL landslide; in Section 7.2, we discuss our analysis of the runoff under current (2014-2015) drainage conditions; and in Section 7.3, we discuss our analysis of the runoff under post-proposed project completion drainage conditions.

Implementation of the SWMS will, in addition, filter and treat the retained storm water for non-potable on-site and potential City public agency reuse to avoid water waste. The SWMS thus meets the applicable storm water management objectives to maintain/reduce peak storm water runoff volumes, reduce discharge rates, and enhance storm water quality.

7.1 Storm Water Runoff from Pre-1978 ECDLL Landslide Developed Conditions

Developed use (1956-1978) of the parcel with the single-family residence, driveway, drainage devices, other appurtenances, and grading created impervious/semi-pervious surfaces and drain lines (flow lines) that constitute the baseline drainage conditions on the parcel for this Hydrology Report. The pre-landslide development (structures and grading) envelope, as further described in Section 5 above, consisted of an area of 6,718 ft².

Appendix E contains the quantitative hydrologic analysis of storm water runoff prior to the 1978 ECDLL landslide from both the pre-1978 landslide developed envelope on 1925 ECDLL, as well as from the parcel in its entirety. Figure 2, our Pre-Landslide Drainage Map (June 2015), depicts the drainage conditions and respective sub-catchments in plan view on the City's 1965 topographic base map.

In summary, the City 25-year, 6.71-inch/24-hour rainfall design event generated the following storm water runoff volumes from the pre-1978 landslide development envelope sub-catchments, for a total of 5,962 cf:

- (a) 1,076 cf from SC-PREs A and B, the upper joint 1925-1927 ECDLL driveway and the east side yards adjacent to it and to SC-PRE 1, which in parts drained via the 1921 ECDLL driveway, or directly, to the head of the 1921-1925 ECDLL drainage ditch;
- (b) 3,036 cf from SC-PRE 1, 2, 3, 4a and 4b, which also in parts drained via the 1921 ECDLL driveway, or directly, to the 1921-1925 ECDLL drainage ditch;

(c) 354 cf from SC-PRE 5 *in situ*, which also discharged to the 1921-1925 ECDLL drainage ditch;

(d) 1,788 cf from SC-PRE 6 *in-situ*, which in parts drained by overland flow (sheet flow) to adjacent 1921 ECDLL and 1927 ECDLL, and along the diagonal hillside path on the parcel to the head of the (zig-zag) beach access path that previous to 1978 had been excavated from the coastal bluff face, between the gate in the E-W fence near the coastal bluff edge and the coastal bluff base;

(e) 320 cf from SC-PRE 7 *in-situ*, to the back beach; and,

(f) 464 cf from the back beach in SC-PRE 8 *in-situ*, to the receiving waters of the Santa Barbara Channel of the Pacific Ocean.

Appendix F contains our detailed runoff calculations for the parcel, in its entirety, and for the pre-1978 ECDLL landslide structural development/grading envelope during the City's maximum design rainfall event.

7.2 Storm Water Runoff from Current (2014-2015) Developed Conditions

Under current (2014-2015) conditions, Sub-Catchments SC-3, SC-4, SC-5, SC-7, SC-8, SC-11 (in part, by the MTLs buttress), SC-12 (in part, by the MTLs buttress), SC-13, SC-17 (in part, by the City landslide debris fill/cover), and SC-18 (in part, by the City landslide debris fill/cover) are developed with California coastal program structures. In addition, under current (2014-2015) conditions, SC-6, SC-14 and SC-15 are developed with City (1978) partly, but undocumented, compacted grading and Doolittle (1984) documented compacted grading. Together, these areas constitute the current California coastal program (Coastal Act, certified LCP) development envelope on the parcel.

CSA has characterized the current drainage areas, runoff conditions, and drainage directions (drain lines) on the parcel based on our field observations and site-specific topographic survey (2010, 2014). Figure 3, the Current (2014-2015) Conditions Drainage Map, depicts the Sub-Catchments that are located on the parcel. As discussed in Section 4, above, to calculate the runoff volumes generated during the City's maximum design rainfall event (25-year 6.71-inch/24-hour) from these Sub-Catchments under current conditions, we have located *hypothetical* water storage tank WST A at the at the southerly edge of SC-6, which receives runoff from SC-3, SC-4, and SC-6. We have located *hypothetical* WST B at the southerly property line along SC-21 to receive runoff from SC-7, SC-8, SC-11, SC-12, SC-17, SC-18, SC-19, SC-20 and SC-21. These hypothetical water storage tanks are for volumetric analysis purposes only and are, of course, not physically present on the parcel.

Under current conditions, the City 25-year, 6.71-inch/24-hour rainfall design event generates the following storm water runoff volumes:

- (a) 555 cf from the upper driveway (SC-3) to the 1921 ECDLL driveway;
- (b) 647 cf from the lower driveway (SC-4) to the 1921 ECDLL driveway;
- (c) 426 cf from the side yard east of the upper and lower driveways (SC-6) to the 1921 ECDLL driveway;
- (d) 366 cf from the relict house entry, turnaround, and carport driveway pavement, with a thin fill veneer, and rilling eroded City (1978) MTLs buttress (SC-5) to downslope 1925 ECDLL;
- (e) 261 cf from the relict turnaround and carport driveway pavement, with a thin fill veneer, and rilling eroded City (1978) MTLs buttress (SC-7) to downslope 1925 ECDLL;
- (f) 253 cf from the City (1978) MTLs buttress (SC-8) to downslope 1925 ECDLL;
- (g) 167 cf from the City (1978) MTLs buttress, and the City (1978) earthen material borrow area (both in SC-11) to downslope 1925 ECDLL and adjacent 1927 ECDLL;
- (h) 96 cf from the City (1978) MTLs buttress, and the City (1978) earthen material borrow area (both in SC-12) to downslope 1925 ECDLL;
- (i) 329 cf from the City (1978) MTLs buttress, and the City (1978) earthen material borrow area (both in SC-13) to downslope 1925 ECDLL;
- (j) 250 cf from the City (1978) earthen material borrow area (in SC-14) to downslope 1925 ECDLL and adjacent 1921 ECDLL;
- (k) 122 cf from the City (1978) earthen material borrow area and the Doolittle (1984) grading envelope (both in SC-15) to downslope 1925 ECDLL and adjacent 1921 ECDLL;
- (l) 401 cf from the City (1978) earthen material borrow area (in SC-17) to downslope 1925 ECDLL and adjacent 1921 ECDLL, and from the Doolittle (1984) grading envelope (in westerly SC-17) to 1927 ECDLL;

(m) 156 cf from the City (1978) landslide debris cover (in SC-18) and from the Doolittle (1984) grading envelope (in westerly SC-18) to downslope 1925 ECDLL and adjacent 1927 ECDLL;

(n) 220 cf from the City (1978) landslide debris cover (in SC-19), the City (1978) repositioned lemonade berry area (in SC-19), and the Doolittle (1984) grading envelope (in westerly SC-19) to downslope 1925 ECDLL and adjacent 1927 ECDLL;

(o) 185 cf from the coastal bluff (SC-20) downslope to the back beach area;

(p) 895 cf from the back beach area (SC-21) to the receiving waters of the Santa Barbara Channel of the Pacific Ocean.

In sum, the maximum City rainfall design event under current (2014-2015) conditions generates 5,329 cf of runoff from the parcel.

Appendix F contains our detailed runoff calculations for the parcel, in its entirety, and for the current California coastal program structural development/grading envelope during the City 6.71-inch, 24-hour/25-year recurrence rainfall event.

7.3 Storm Water Runoff from Post-Project Completion Conditions

At completion (including incorporation of our recommendations in this Hydrology Report), the proposed residential reuse, conservation and restoration project will consist of (a) 17 storm water Sub-Catchments, (b) strategically located drain inlets, trench drains, and horizontal drains, (c) three subsurface water storage tanks, with a combined capacity of 36,255 gallons (4,847 cf), (d) associated pipes, pumps, filtration and treatment components, and (e) outfalls that non-erosively discharge storm water in excess to the storage capacity of the three tanks. In combination with a comprehensive suite of operational BMPs, the structural BMPs will intercept and retain, for beneficial on-site and potential City public agency reuse, the storm water runoff from impervious and semi-pervious surfaces generated by the City's design storm events up to and including the 25-year, 6.71-inch, 24-hour rain storm.

Retained water will be treated for on-site (non-potable) use and for potential City public agency use. Excess storm water to the design capacity of the three tanks will be non-erosively discharged, in order of priority to avoid water waste, (1) by gravity flow to multiple outfalls for continued sustainability of the contiguous deep-rooted lemonade berry shrubs on the parcel (in Sub-catchment 19), and (2) in regulated amounts (not to exceed 25 gpm per tank before and/or after the peak of the hydrograph has passed) to the ECDLL municipal storm drain. Runoff from the lower side yards of the replacement house and from the lower private open space area (Sub-Catchment 17) will be collected and directed by small cobble-lined flow lines to discharge by gravity flow to the

proposed horticultural lemonade berry mitigation area (Sub-Catchment 18), for its establishment and sustainability. Existing drainage patterns along the joint 1925-1927 ECDLL driveway (Sub-Catchments 3 and 4) will be maintained; however, runoff volumes from the 1925 ECDLL driveway segment to adjacent 1921 ECDLL will be reduced through interception of storm water discharged by the widened/new driveway segment and adjacent restored east side yard (Sub-catchment 6), which area presently also discharge to the 1921 ECDLL driveway.

7.3.1 Post-Project Completion Storm Water Runoff Duration Results

By intercepting all storm water runoff from the proposed residential reuse structural development envelope during the maximum City design rainfall event (as well as lesser rainfall events), the SWMS will reduce the runoff flow rate (volume/duration or cubic feet per second) from the perimeter of that area by on-site retention (detention) to zero (0 cfs), from up to 0.65 cfs during pre-1978 ECDLL landslide developed conditions, and 0.53 cfs during current conditions.

Similarly, the SWMS will reduce the storm runoff flow rate from the parcel, in its entirety, to up to 0.31 cfs, from 1.33 cfs during pre-1978 ECDLL landslide developed conditions and 0.96 cfs during current conditions.

The SWMS will reduce the storm runoff flow rate from the joint 1925-1927 ECDLL driveway and adjacent eastern 1925 ECDLL side-yard to 0.22 cfs, from 0.41 cfs during pre-1978 ECDLL landslide developed conditions and 0.29 cfs during current conditions (when the seasonal sand bags are in place along the E-W fence line).

In the following Table 7.1, we summarize the reductions in storm water runoff flow rates during the maximum City design rainfall event by the entire parcel and by the development envelope, under pre-1978 landslide developed conditions, current conditions, and proposed post-project completion conditions on the parcel.

**Table 7.1 - SWMS Reductions In Maximum City Design Rainfall Event Runoff Flow Rate
(cubic feet per second)**

CONDITIONS	Entire Parcel	Development Envelope
1. Pre-1978 Landslide		
1.1 Upper Driveway:	0.12 cfs/9.96 hrs	0.12 cfs/9.96 hrs
1.2 East Driveway Side-Yard:	0.08 cfs/9.99 hrs	0.08 cfs/9.99 hrs
1.3 Lower Driveway, House/ Carport Entry and Turnaround Pavement	0.21 cfs/9.96 hrs	0.21 cfs/9.96 hrs

CONDITIONS	Entire Parcel	Development Envelope
1.4 West Side Yard (4-ft wide)	0.06 cfs/9.97 hrs	0.06 cfs/9.97 hrs
1.5. East Side Yard (4-ft wide)	0.06 cfs/9.97 hrs	0.06 cfs/9.97 hrs
1.6 Residence, Carport, Lower Balcony:	0.10 cfs/9.98 hrs	0.10 cfs/9.98 hrs
1.7 Vegetated Manufactured Slope Below House	0.07 cfs/9.98 hrs	0.07 cfs/9.98 hrs
1.8 Hillside Garden Paths and Fencing:	0.35 cfs/9.98 hrs	NA
1.9 Coastal Bluff	0.04 cfs/10.01 hrs	NA
1.10 Back Beach Area	0.09 cfs/9.97 hrs	NA
Total Drainage Volume/Time	7,038 cf/9.99 hrs	3,391 cf/9.97 hrs
2. Current (2014-2015)		
2.1 SC-3 ([E] Upper Driveway)	0.10 cfs/9.96 hrs	0.10 cfs/9.96 hrs
2.2 SC-4 ([E] Mid-Joint Driveway and 1927 ECDLL Garage Driveway Apron)	0.12 cfs/9.96 hrs	0.12 cfs/9.96 hrs
2.3 SC-5 ([E] Relict Concrete, Eroded City MTLs Buttress)	0.07 cfs/9.97 hrs	0.07 cfs/9.96 hrs
2.4 SC-6 ([E] Ruderal/Horticultural Vegetation and V-Ditch East Side Yard)	0.07 cfs/10.02 hrs	0.07 cfs/10.02 hrs
2.5 SC-7 ([E] Relict Concrete, Eroded City MTLs Buttress)	0.05 cfs/9.97 hrs	0.05 cfs/9.97 hrs
2.6 SC-8 ([E] City MTLs Buttress)	0.05 cfs/9.98 hrs	0.05 cfs/9.98 hrs
2.7 SC-11 ([E] Relict Concrete, Eroded and <i>In-Situ</i> City MTLs Buttress, City Excavation Area)	0.03 cfs/9.97 hrs	0.03 cfs/9.97 hrs
2.8 SC-12 ([E] Eroded and <i>In-Situ</i> City MTLs Buttress, City Excavation Area)	0.02 cfs/9.98 hrs	0.02 cfs/9.98 hrs
2.9 SC-13 ([E] <i>In-Situ</i> City MTLs Buttress, City Excavation Area)	0.06 cfs/9.98 hrs	0.06 cfs/9.98 hrs

CONDITIONS	Entire Parcel	Development Envelope
2.10 SC-14 ([E] City Excavation Area)	0.05 cfs/9.98 hrs	0.05 cfs/9.98 hrs
2.11 SC-15 ([E] City Landslide Debris Fill Cover)	0.02 cfs/9.98 hrs	0.02 cfs/9.98 hrs
2.12 SC-16 (Below SC-5, SC-7, SC-8, SC-11, SC-12, SC-13, SC-14, SC-15, and SC-17)	NA	NA
2.13 SC-17 ([E] City Landslide Debris Fill Cover)	0.08 cfs/9.98 hrs	0.08 cfs/9.98 hrs
2.14 SC-18 ([E] City Landslide Debris Fill Cover)	0.03 cfs/9.98 hrs	0.03 cfs/9.98 hrs
2.15 SC-19 ([E] Contiguous Lemonade Berry Shrubs)	0.01 cfs/17.16 hrs	NA
2.16 SC-20 ([E] Coastal Bluff)	0.02 cfs/10.01 hrs	NA
2.17 SC-21 ([E] Back Beach)	0.18 cfs/9.97 hrs	NA
Total Drainage Volume/Time	5,328 cf/9.97 hrs	1,904 cf/9.97 hrs
3. Post-Project Completion		
2.1 SC-3 ([E] Upper Driveway) Driveway Apron)	0.10 cfs/9.96 hrs	0.10 cfs/9.96 hrs
2.2 SC-4 ([E] Mid-Joint Driveway and 1927 ECDLL Garage	0.12 cfs/9.96 hrs	0.12 cfs/9.96 hrs
2.3 SC-5 ([N] Upper Private Open Space)	0.05 cfs/9.98 hrs	0.05 cfs/9.98 hrs
2.4 SC-6 ([N] Widened/New Driveway and Adjacent East Side Yard)	0.15 cfs/9.97 hrs	0.15 cfs/9.97 hrs
2.5 SC-7 ([N] New Lower Driveway)	0.07 cfs/9.96 hrs	0.07 cfs/9.96 hrs
2.6 SC-8 ([N] Garage Entry Driveway, Turnaround)	0.10 cfs/9.96 hrs	0.10 cfs/9.96 hrs
2.7 SC-11 ([N] Upper West Side Yard, 6-ft wide)	0.04 cfs/9.97 hrs	0.04 cfs/9.97 hrs

CONDITIONS	Entire Parcel	Development Envelope
2.8 SC-12 ([N] Upper East Side Yard, 6-ft wide)	0.03 cfs/9.97 hrs	0.03 cfs/9.97 hrs
2.9 SC-13 ([N] North-Draining House Entry and Garage Roof, Entry Deck)	0.13 cfs/9.96 hrs	0.13 cfs/9.96 hrs
2.10 SC-14 ([N] South-Draining House Roof and Planters)	0.10 cfs/9.96 hrs	0.10 cfs/9.96 hrs
2.11 SC-15 ([N] Lower House Level Patio and House-Patio Steps)	0.05 cfs/9.96 hrs	0.05 cfs/9.96 hrs
2.12 SC-16 ([N] Subsurface Horizontal Drain Service Area)	0.01 cfs	0.01 cfs
2.13 SC-17 ([N] Lower West and East Side Yards, 6-ft wide, Lower Private Open Space Area, min. 20 ft. dimensions)	0.09 cfs/9.98 hrs	NA
2.14 SC-18 ([N] Horticultural Lemonade Berry Mitigation Area)	0.01 cfs/9.96 hrs	NA
2.15 SC-19 ([E] Contiguous Lemonade Berry Shrubs)	0.01 cfs/17.16 hrs	NA
2.16 SC-20 ([E] Coastal Bluff)	0.02 cfs/10.01 hrs	NA
2.17 SC-21 ([E] Back Beach) Total Drainage Volume/Time	0.18 cfs/9.97 hrs	NA
Total Drainage Volume/Time	6,653 cfs/9.97 hrs	2,753 cf/9.97 hrs

7.3.2 Post-Project Completion Storm Water Volumetric Reduction Results

During the City design rainfall events, the SWMS will intercept and retain (detain) on-site (on the parcel) all storm water from the proposed (new) residential reuse project structural development envelope. During multi-day storm events, at such times as when the three tanks are at their design storage capacity, or in storm events that are larger than the City's maximum design storm, the SWMS provides for (1) first priority discharge of intercepted storm water to SC-19 (when all storage tanks are at their capacity), (2) second priority discharge to a City cistern in the ECDLL right-of-way, if the City determines to install that tank, and (3) third priority discharge by pumping, at a maximum combined rate of 0.17 cfs (25 gpm per tank), to the ECDLL municipal storm

drain. Discharge of storm water from the parcel, in its entirety, will be reduced by the SWMS to 2,994 cf/24 hours, compared to 5,328 cf/24 hours under current conditions and 7,038 cf/24 hours under pre-1978 landslide developed conditions. Discharge of storm water from the existing joint 1925-1927 ECDLL driveway and adjacent east side-yard on 1925 ECDLL to 1921 ECDLL will be reduced by the SWMS to 1,202 cf/24 hours, compared to 1,628 cf/24 hours under current conditions and 2,199 cf/24 hours under pre-1978 landslide developed conditions.

In the following Table 7.2, we summarize the proposed post-project completion drainage conditions by Sub-Catchments for the parcel, in its entirety, and for the proposed structural development area. The 24-hour/3.20-inch rainfall (RF) constitutes the City design storm 2-year recurrence event; the 24-hour/4.61-inch rainfall, the 5-year event; the 24-hour/5.55-inch rainfall, the 10-year event; and the 24-hour/6.71-inch rainfall, the 25-year event. The acronym “cfs” means “cubic feet per second”; “cf” means “cubic foot” or “cubic feet”. The column “Drains to” refers to the receiving device (water tank), conservation area (e.g., lemonade berry shrubs), or receiving water body (Santa Barbara Channel).

**Table 7.2 - Post-Project Completion Drainage Conditions (24-Hour Volumes)
By Sub-Catchment**

Sub-Catchment	24-hr/3.20” RF	24-hr/4.61” RF	24-hr/5.55” RF	24-hr/6.71” RF	Drains to:
3	254 cf	375 cf	0.09cfs/455 cf	0.10cfs/555cf	1921 ECDLL
4	297 cf	437 cf	0.10cfs/531 cf	0.12cfs/647cf	1921 ECDLL
5	54 cf	118 cf	168 cf	234 cf	WST-2
6	348 cf	525 cf	645 cf	795 cf	WST-1
7	161 cf	238 cf	289 cf	352 cf	WST-2
8	237 cf	348 cf	424 cf	516 cf	WST-2
11	72 cf	116 cf	147 cf	187 cf	WST-3
12	56 cf	90 cf	115 cf	146 cf	WST-3
13	308 cf	453 cf	551 cf	671 cf	WST-2
14	234 cf	344 cf	418 cf	509 cf	WST-3
15	114 cf	168 cf	204 cf	248 cf	WST-3
16					WST-3
17	121 cf	238 cf	326 cf	442 cf	SC-18

Sub-Catchment	24-hr/3.20" RF	24-hr/4.61" RF	24-hr/5.55" RF	24-hr/6.71" RF	Drains to:
18	15 cf	23 cf	33 cf	50 cf	SC-18
19	0 cf	22 cf	87 cf	220 cf	SC-19, SC-20, 1927 ECDLL 1921 ECDLL
20	12 cf	62 cf	111 cf	185 cf	SC-21
21	330 cf	550 cf	702 cf	895 cf	SB Channel
Total to 1921 ECDLL	551 cf	812 cf	986 cf	1,202 cf	1921 ECDLL
Total Development Area	1,720 cf	2,661 cf	3,320 cf	4,150 cf	On-site WSTs and SC-18
Total Parcel	2,613 cf	4,107 cf	5,206 cf	6,652 cf	SC-3 thru SC-18/19: WSTs, in situ in SC-18 & SC-19 (lower part), SC-20 and SC-21: in situ & to S.B. Channel

On Table 7.3 below, we list the proposed SWMS individual drain inlets, drain trenches, and drainage outfalls, including their respective inlet (top/grate) elevations and their invert (base of outlet) elevations as well as where they discharge to.

On Table 7.4 (following Table 7.3), we list the routes, lengths, diameters and capacities of proposed SWMS drainpipes.

Appendix G contains our post-project completion hydrologic calculations for each of these Sub-Catchments under the 2-year, 5-year, 10-year, and 25-year recurrence/24-hour City design rainfall events.

Table 7.3 - Post-Project Drainage Completion Drainage Collection Devices

Device	Description	Elevation (feet) Top (of Grate) Invert		Discharges to Device/Area
1P	(N) Replacement Curb with SWMS excess water outfalls	Varies	Varies	City municipal storm drain in ECDLL

Device	Description	Elevation (feet)		Discharges to Device/Area
		Top (of Grate)	Invert	
2P	(N) 8-inch high berm along east side of widened driveway side yard	Varies	Varies	Drain Inlet (DI) 6P
3P	(N) Drain Inlet with at SE base of (E) Upper Joint 1925-1927 ECDLL Driveway	137.0	135.0	Drain Junction Box 4.5 P
4P	(N) Trench Drain across base of (E) Lower Joint 1925-1927 ECDLL Driveway	130.5	128.5	Drain Junction Box 4.5 P
5P	(N) Drain Inlet in SE arc of (N) Upper Private Open Space	129.0	127.0	Water Storage Tank (WST) 2
6P	(N) Drain Inlet at Base of (N) Widened 1925 ECDLL Driveway	130.5	128.5	WST 1
7P	(N) Trench Drain across base of (N) Lower 1925 ECDLL Driveway	123.5	121.5	WST 2
8P	(N) Trench Drain across base of (N) 1925 ECDLL Garage Entry Driveway	121.5	119.5	WST 2
11P	(N) Drain Inlet at base of West Side Yard (upslope from 97 ft.)	97.0	95.1	WST 3
12P	(N) Drain Inlet at base of East Side Yard (upslope from 97 ft.)	97.0	95.1	WST 3
13P	(N) Drain Inlet for (N) 1925 ECDLL House Foyer Roof, Foyer Deck, and Garage Roof	121.0	119.0	WST 2
14P	(N) Drain Inlet for (N) House Roof South Segment	98.0	95.1	WST 3
15P	(N) Drain Inlet for (N) Lower Patio, Lower House to Patio Steps	95.0	95.1	WST 3
16P	(N) Collector Pipe for Horizontal Drains	As Designed	As Designed	WST 3

Device	Description	Elevation (feet) Top (of Grate) Invert		Discharges to Device/Area
17P	(N) Cobble-lined 1925 ECDLL Lower Side Yard Flow Lines	As Designed	As Designed	Cobble-lined Flow Lines on SC-18
18P	(N) Cobble-lined Flow Lines	As Designed	As Designed	Outfalls (typ.) 1, 2, 3, 4 on SC-18
19P	Multi-Port Excess Storm Water Outfall along SC-18/SC-19 Boundary, with Energy Dissipaters	As Designed	As Designed	Sub-catchment 19, for (E) Lemonade Berry Shrub Sustainability
WST-1	Water Storage Tank below lower SC-6	In-invert: 127.50	Out-invert: 127.00	Priority sequence: 1. WST-2 2. WST-3 3. SC-19 4. City ECDLL Cistern (if available) 5. ECDLL Municipal Storm Drain
WST-2	Water Storage Tank below SC-8	In-invert: 118.50	Out-invert: 117.50	Priority sequence: 1. For Non-potable Reuse in the Replacement House 2. WST-3 3. SC-19 4. City ECDLL Cistern (if available) 5. ECDLL Municipal Storm Drain
WST-3	Water Storage Tank/Lap Pool in SC-15	In-invert: 95.0	Out-invert: 95.0	Priority sequence: 1. WST-1 2. SC-19 3. City ECDLL Cistern (if available) 4. ECDLL Municipal Storm Drain

Table 7.4 - Proposed SWMS Drain Pipes.

Drain Pipe BMP #	From Device	To Device	Length (ft)	Diameter (in)	Capacity (cfs)
DP 1	3P	4.5P	85.0	4.0	0.10

Drain Pipe BMP #	From Device	To Device	Length (ft)	Diameter (in)	Capacity (cfs)
DP 2	4P	4.5P	20.0	4.0	0.12
DP 3	4.5P	SDO 1	5.0	6.0	0.22
DP 4	6P	WST-1	5.0	4.0	0.15
DP 5	WST-1	WST-2	As Designed	As Designed	As Designed
DP 6	WST-1	SDO 2	10.0	6.0	0.15
DP 7	WST-2	WST-1	As Designed	As Designed	As Designed
DP 8	7P	WST-2	10.0	4.0	0.07
DP 9	8P	WST-2	20.0	4.0	0.10
DP 11	WST-2	WST-3	As Designed	As Designed	As Designed
DP 12	WST-3	WST-2	As Designed	As Designed	As Designed
DP 13	WST-2	SDO-3	As Designed	As Designed	As Designed
DP 14	WST-3	SDO-4	As Designed	As Designed	As Designed
DP 15	WST-1	SDO-5	As Designed	As Designed	As Designed
DP 16	WST-2	SDO-5	As Designed	As Designed	As Designed
DP 17	WST-3	SDO-5	As Designed	As Designed	As Designed
DP 18	11P	WST-3	31.0	4.0	0.04
DP 19	12P	WST-3	35.0	4.0	0.03
DP 20	13P	WST-2	10.0	4.0	0.13
DP 21	14P	WST-3	5.0	4.0	0.10
DP 22	15P	WST-3	5.0	6.0	0.05
DP 23	16Pa 16Pb 16Pc 16Pd	WST-3	As Designed	As Designed	As Designed

Drain Pipe BMP #	From Device	To Device	Length (ft)	Diameter (in)	Capacity (cfs)
DP 24	17a 17b 17c 17d	SC-18	As Designed	As Designed	As Designed
DP 25	18a 18b 18c 18d	SC-19	As Designed	As Designed	As Designed
DP 26	WST-1	STP	As Designed	As Designed	25 gpm
DP 27	WST-3	STP	As Designed	As Designed	25 gpm

7.3.3 Post-Project Completion Storm Water Quality Results

In addition to the substantial reductions in storm water volume runoff from the post-project completion structural development envelope and the parcel in its entirety, the recommended SWMS provides for the following storm water quality enhancements:

(1) Available trash (debris and floatables) for potential mobilization by storm water runoff should be minimized through regular driveway and adjacent street edge sweeping, installation and maintenance of trash grates and specified filtration on the DI's and TD's, provision of enclosed space for garbage cans, and regular maintenance of horticultural native vegetation landscaping to avoid accumulation of plant debris.

(2) Proposed utilization of locally/regionally native vegetation in landscaping should avoid the need for introduction of nutrients (nitrogen and phosphorous), pesticides (insecticides, rodenticides), and herbicides (fungicides) at the parcel.

(3) Cessation (prohibition) of transient/homeless camping in the dense lemonade berry shrubs on the immediate coastal bluff top area should eliminate an in-situ source of bacteria (pathogens) in storm water runoff at the site. UVL treatment, that should enhance/maintain the retained (detained) water in the WST's to water contact (swimming pool) standards, should destroy specified pathogens (e.g., algae, bacteria, cysts, viruses, and protozoa) in that water. Monitoring of groundwater quality in SC-16 should assist directly in the avoidance, or immediate remediation, of polluted groundwater to the site.

(4) Planting of all restored earthen surfaces with native vegetation, and installation and maintenance of filters in the specified DIs should avoid (minimize) mobilization of sediment in storm water runoff following project completion. We further recommend (a) that grading at the site be limited to the dry season, with provision for construction material coverage and equipment location/maintenance as provided in the City Manual and Coastal Commission's "standard" conditions, and (b) that the Project "Construction Interim Drainage and Erosion Control Plan" (ABDS, Inc., 2015) specifically incorporate in full the suite of temporary structural and operational storm water quality management BMPs provided by the California Coastal Commission. Appendix D contains the California Coastal Commission's conditions in full.

(5) Recommended regular driveway and garage sweeping, and maintenance of the respective trench drain filtration in BMPs 4P, 7P, and 8P, should control (minimize) the introduction of hydrocarbons (oil and grease) to WST-1, WST-2, and from the existing joint 1925-1927 ECDLL driveway to the 1921 ECDLL driveway. We further recommend immediate reporting to the City of monitoring in SC-16 that identifies the presence of oil or grease in groundwater that is intercepted by the three horizontal subsurface drains.

Appendix C contains our list of recommended structural and operational storm water quality management BMPs.

8.0 LIMITATIONS

Our services consist of professional opinions and conceptual recommendations made in accordance with generally accepted civil and geotechnical engineering principles and practices. No warranty, expressed or implied, or merchantability or fitness, is made or intended in connection with our work, by the proposal for consulting or other services, or by the furnishing of oral or written reports or findings.

CSA assumes that the City will maintain throughout the economic life of the proposed residential reuse and conservation/restoration project both the City storm drain and sanitary sewer facilities such that unanticipated runoff or seepage onto or into the 1925 ECDLL property will be precluded.

We trust that this provides you with the information that you and your design team need at this time to complete the residential reuse project entitlements application to the City.

We look forward to reviewing (1) the updated Project site plan, sections, interim (construction) erosion control and drainage plan, and concept landscaping plan, and (2) the updated grading plan and sections, and permanent drainage and erosion control

plan and sections, and will provide our letter regarding project design conformance with our Hydrology Report recommendations on completion of that review.

Thank you for this opportunity to prepare the hydrologic analysis and this Hydrology Report for the proposed residential reuse and conservation/restoration project on the Emprise Trust's parcel at 1925 El Camino De La Luz, Santa Barbara, California. If you have any questions, or need additional information, please contact us.

Very truly yours,



COTTON, SHIRES AND ASSOCIATES, INC.

A handwritten signature in blue ink, appearing to read "Patrick O. Shires", written over a horizontal line.

Patrick O. Shires
Senior Principal Civil and Geotechnical Engineer
RCE 26397, GE 770

POS:st

Attachments:

Figure 1 - Post-Proposed Project Completion Drainage Map;

Figure 2 - Pre-Landslide Drainage Map;

Figure 3 - Current (2014-2015) Drainage Conditions Map;

Appendix A, Analysis of Pre-1978 ECDLL Landslide Drainage Conditions at 1925 ECDLL and Tributary Areas;

Appendix B, Piezometer Monitoring Reports (2011-2014), 1925 ECDLL, Santa Barbara;

Appendix C, Recommended Structural and Operational Storm Water Management BMPs, Proposed Residential Reuse, Conservation, and Restoration Project, 1925 ECDLL, Santa Barbara;

Appendix D, California Coastal Commission Standard "Special Condition" Storm Water Management Criteria;

Appendix E, HydroCAD Quantitative Analysis for SC-PRE A, B, and 1-8, Pre-1978 ECDLL Landslide, 25-Year, 24-Hour, 6.71-Inch Rainfall Event at 1925 ECDLL, Santa Barbara;











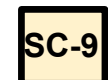
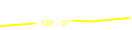
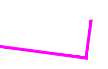

Appendix F, HydroCAD Quantitative Analysis for Current Developed Conditions (Upper and Lower), 2-Year/5-Year/10-Year/25-Year, 24-Hour Rainfall Events at 1925 ECDLL, Santa Barbara;

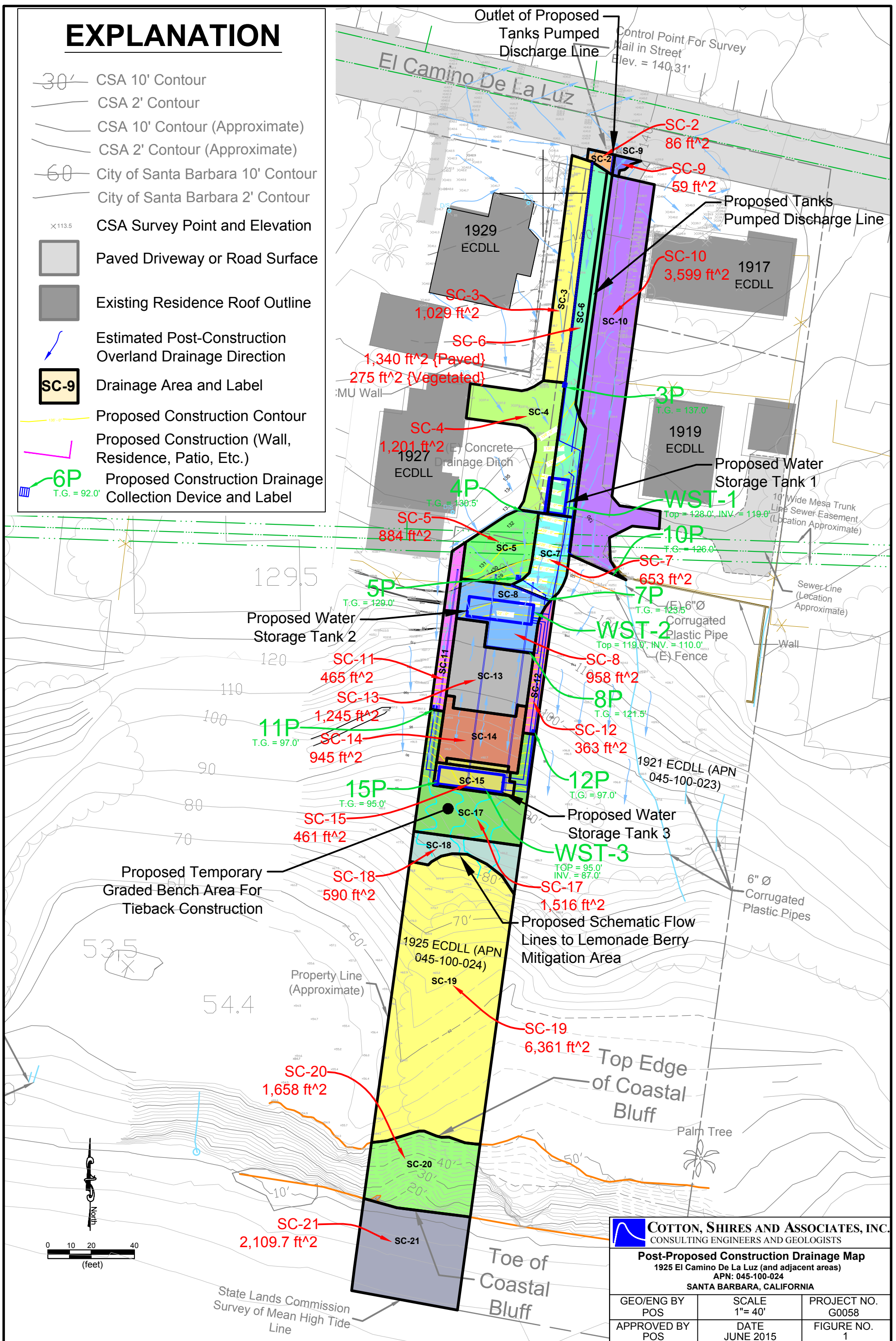
Appendix G, HydroCAD Quantitative Analysis for Post-Project Completion (Upper Areas, Lower Areas and Areas to 1921 Storm Drain) 2-Year/5-Year, 10-Year, and 25-Year/24-Hour Rainfall Events at 1925 ECDLL, Santa Barbara; and

Appendix H, SWMS Maintenance, Monitoring/Reporting and Adaptive Management.

COTTON, SHIRES AND ASSOCIATES, INC.

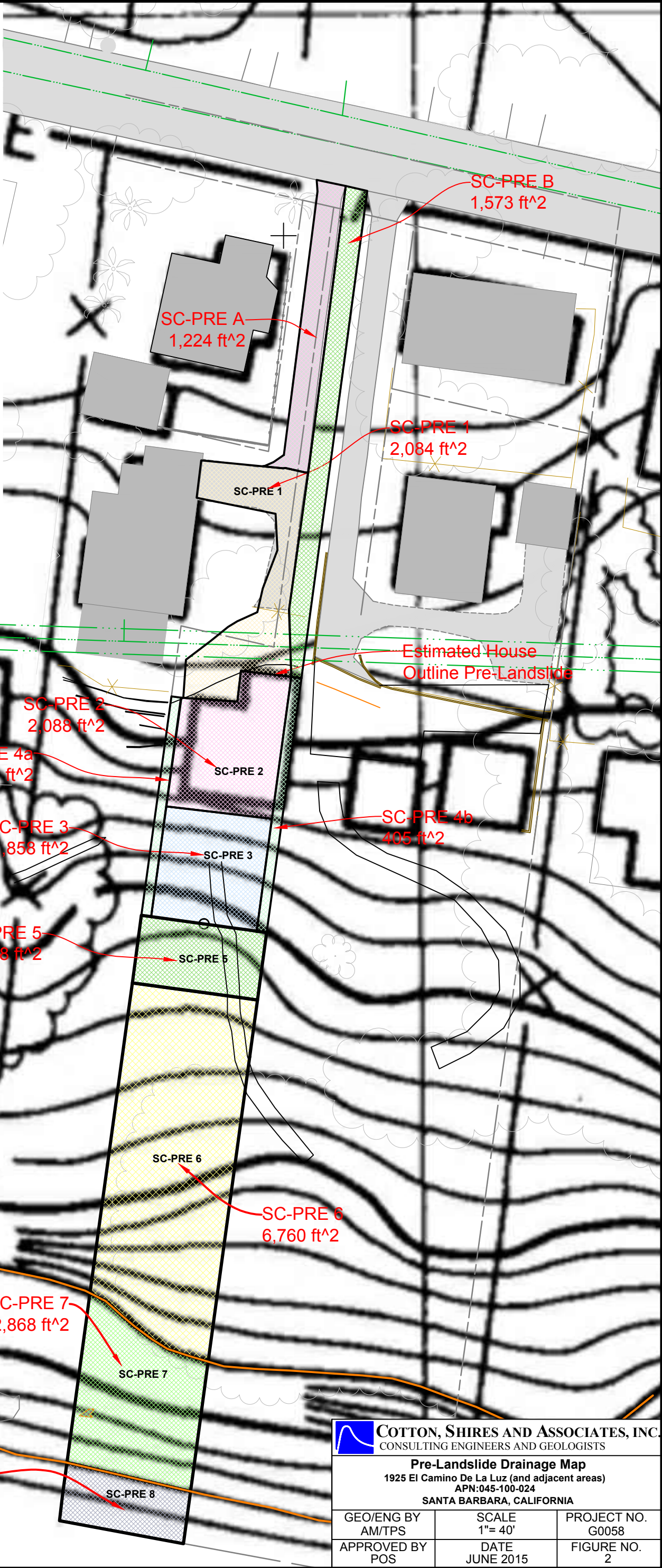
EXPLANATION

-  CSA 30' Contour
-  CSA 2' Contour
-  CSA 10' Contour (Approximate)
-  CSA 2' Contour (Approximate)
-  City of Santa Barbara 10' Contour
-  City of Santa Barbara 2' Contour
-  CSA Survey Point and Elevation
-  Paved Driveway or Road Surface
-  Existing Residence Roof Outline
-  Estimated Post-Construction Overland Drainage Direction
-  Drainage Area and Label
-  Proposed Construction Contour
-  Proposed Construction (Wall, Residence, Patio, Etc.)
-  Proposed Construction Drainage Collection Device and Label



EXPLANATION

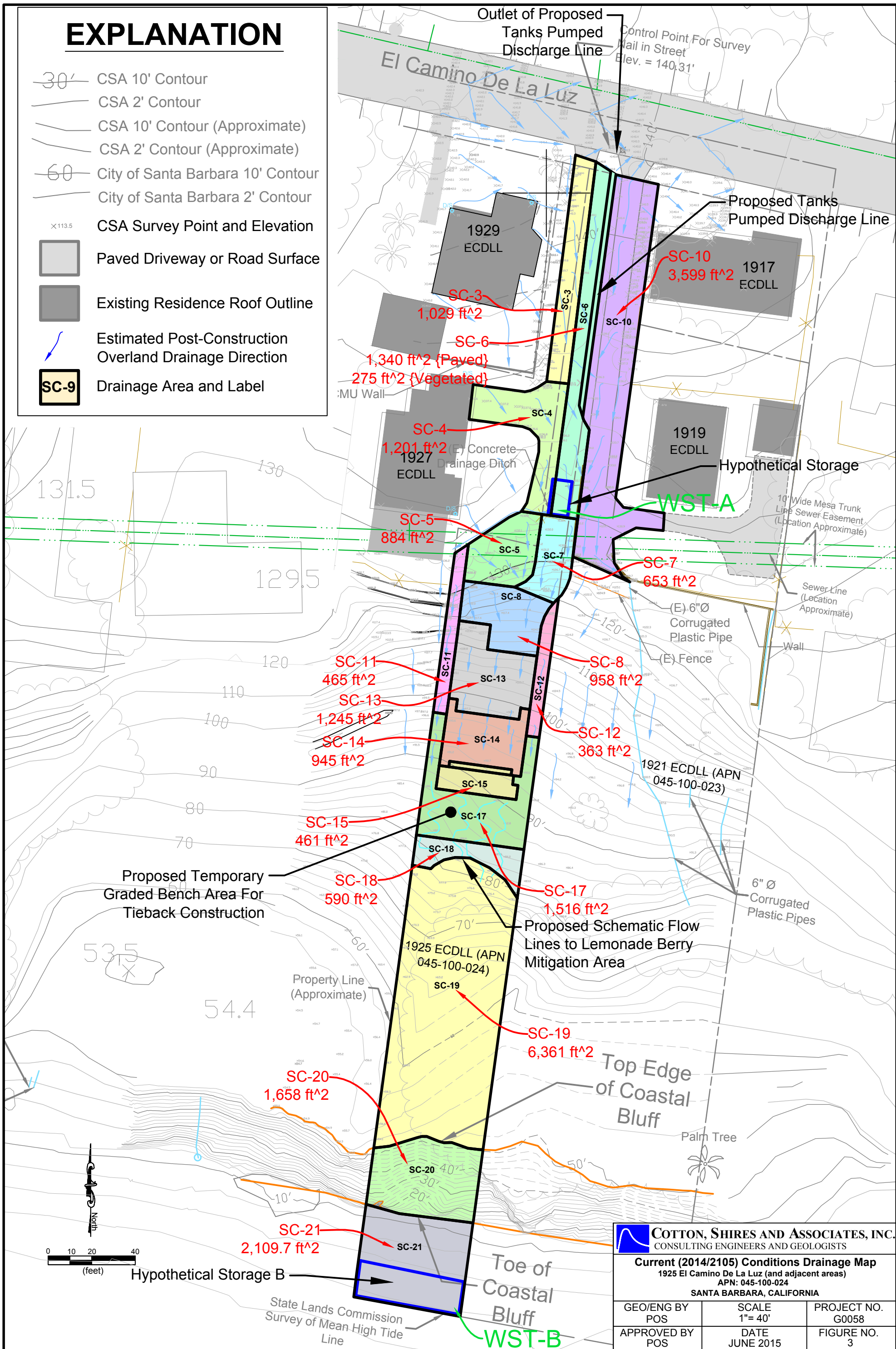
- CSA 10' Contour
- CSA 2' Contour
- CSA 10' Contour (Approximate)
- CSA 2' Contour (Approximate)
- City of Santa Barbara 10' Contour
- City of Santa Barbara 2' Contour
- CSA Survey Point and Elevation
- Paved Driveway or Road Surface
- Existing Residence Roof Outline
- Estimated Pre-Landslide Overland Drainage Direction
- Estimated 1925 ECDLL Residence Roof Outline Prior to Landslide
- Estimated Pre-Landslide Drainage Area and Label
- Proposed Construction (Wall, Residence, Patio, Etc.)



COTTON, SHIRES AND ASSOCIATES, INC. CONSULTING ENGINEERS AND GEOLOGISTS		
Pre-Landslide Drainage Map 1925 El Camino De La Luz (and adjacent areas) APN:045-100-024 SANTA BARBARA, CALIFORNIA		
GEO/ENG BY AM/TPS	SCALE 1"= 40'	PROJECT NO. G0058
APPROVED BY POS	DATE JUNE 2015	FIGURE NO. 2

EXPLANATION

- 30' CSA 10' Contour
- CSA 2' Contour
- CSA 10' Contour (Approximate)
- CSA 2' Contour (Approximate)
- 60' City of Santa Barbara 10' Contour
- City of Santa Barbara 2' Contour
- X113.5 CSA Survey Point and Elevation
- Paved Driveway or Road Surface
- Existing Residence Roof Outline
- Estimated Post-Construction Overland Drainage Direction
- SC-9 Drainage Area and Label



COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Current (2014/2105) Conditions Drainage Map
1925 El Camino De La Luz (and adjacent areas)
APN: 045-100-024
SANTA BARBARA, CALIFORNIA

GEO/ENG BY POS	SCALE 1"= 40'	PROJECT NO. G0058
APPROVED BY POS	DATE JUNE 2015	FIGURE NO. 3

APPENDIX A

Analysis of Pre-1978 ECDLL Landslide Drainage Conditions at 1925 ECDLL and Tributary Areas

The hydrology of the drainage flow down the south side of El Camino De La Luz (ECDLL) in the area of 1925 ECDLL was analyzed by surveying the street, curb, gutter and 1925 driveway in that area using a total station theodolite, conservatively applying rainfall intensity, i in inches per hour, by using 2 inches per hour (greater than a 100-year event), a runoff coefficient, c , of 1.0 (impervious surfaces), calculating the runoff source area, A in acres, from the topographic survey, calculating runoff using the Rational Formula ($Q = c*i*A$).

The source area was determined to be 11,312 square feet or 0.26 acres. The >100-year flow was calculated to be 0.52 cfs.

The hydraulics of the drainage flow down the south side of ECDLL in the area of 1925 ECDLL was then analyzed by surveying two representative cross sections (A-A' through the existing 1925 driveway with berm and B-B' through the curb and gutter upstream of the driveway – a map showing their location and the two cross sections follow in this appendix) and the slope of the street and gutter in that area using a total station theodolite and then calculating capacity for flow using Manning's formula [$Q = (1.49/n)*A*R^{2/3}*S^{1/2}$]. While the slope was surveyed to be 2.6%, a conservative slope value of 2% was used in the calculations.

Based on Manning's equation, the capacity of the street, curb and gutter system in this area is a minimum of 12.1 cfs.

Pumping from all three proposed water storage tanks at 25 gpm per tank would produce 75 gpm or 0.167 cfs of flow down the street, curb and gutter system.

Based on our calculations, the street, curb and gutter system of ECDLL in the project area should easily contain all flows from both rainfall runoff and pumping of the storage tanks with a large factor of safety.

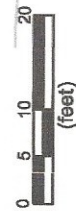
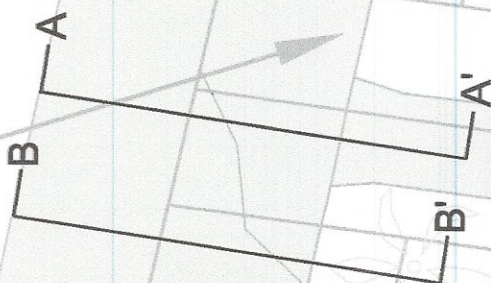
Control Point For Survey
Mail in Street
Elev. = 140.31'

El Camino De L

1917
ECDLL

1925 DRIVEWAY

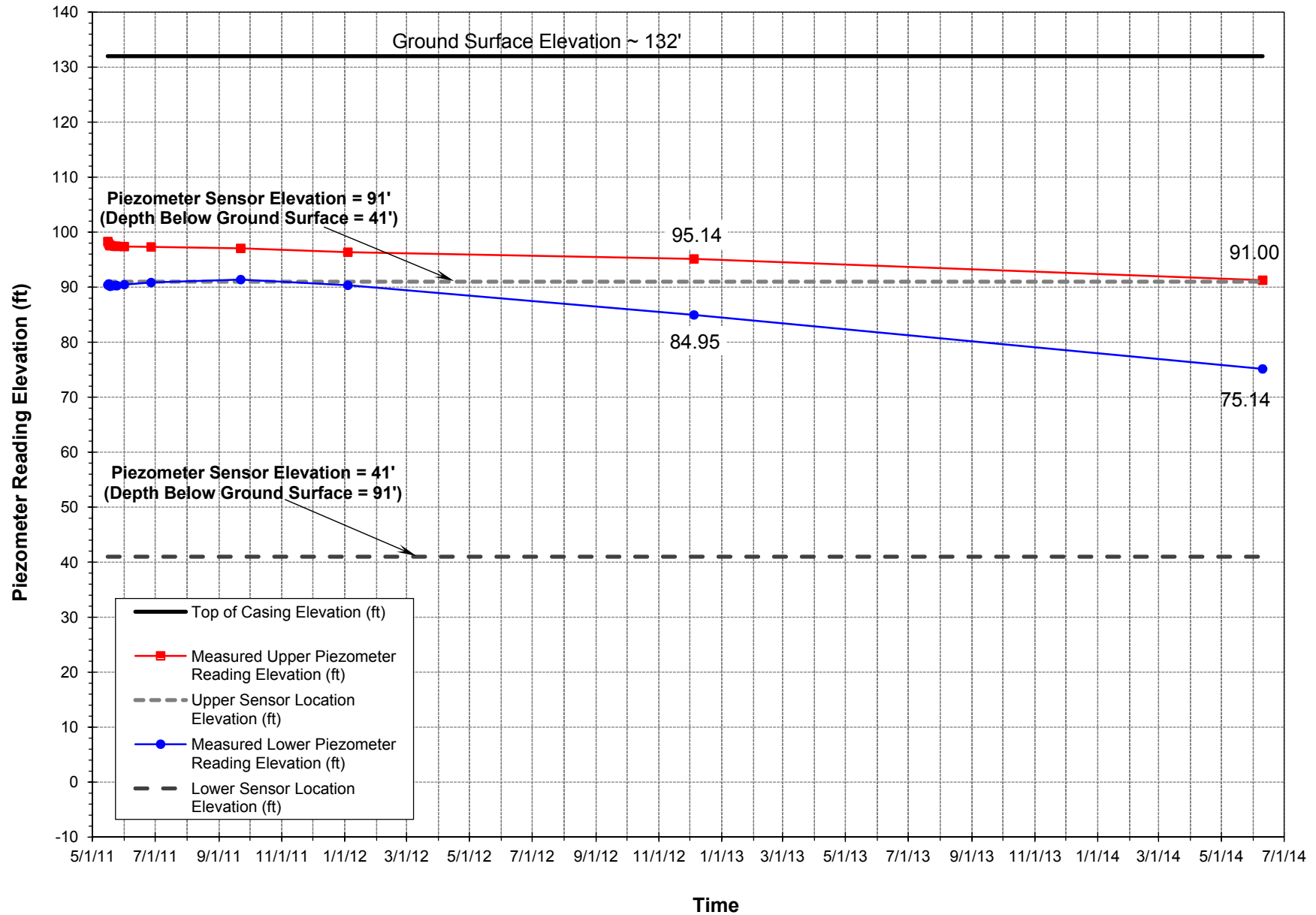
1929
ECDLL



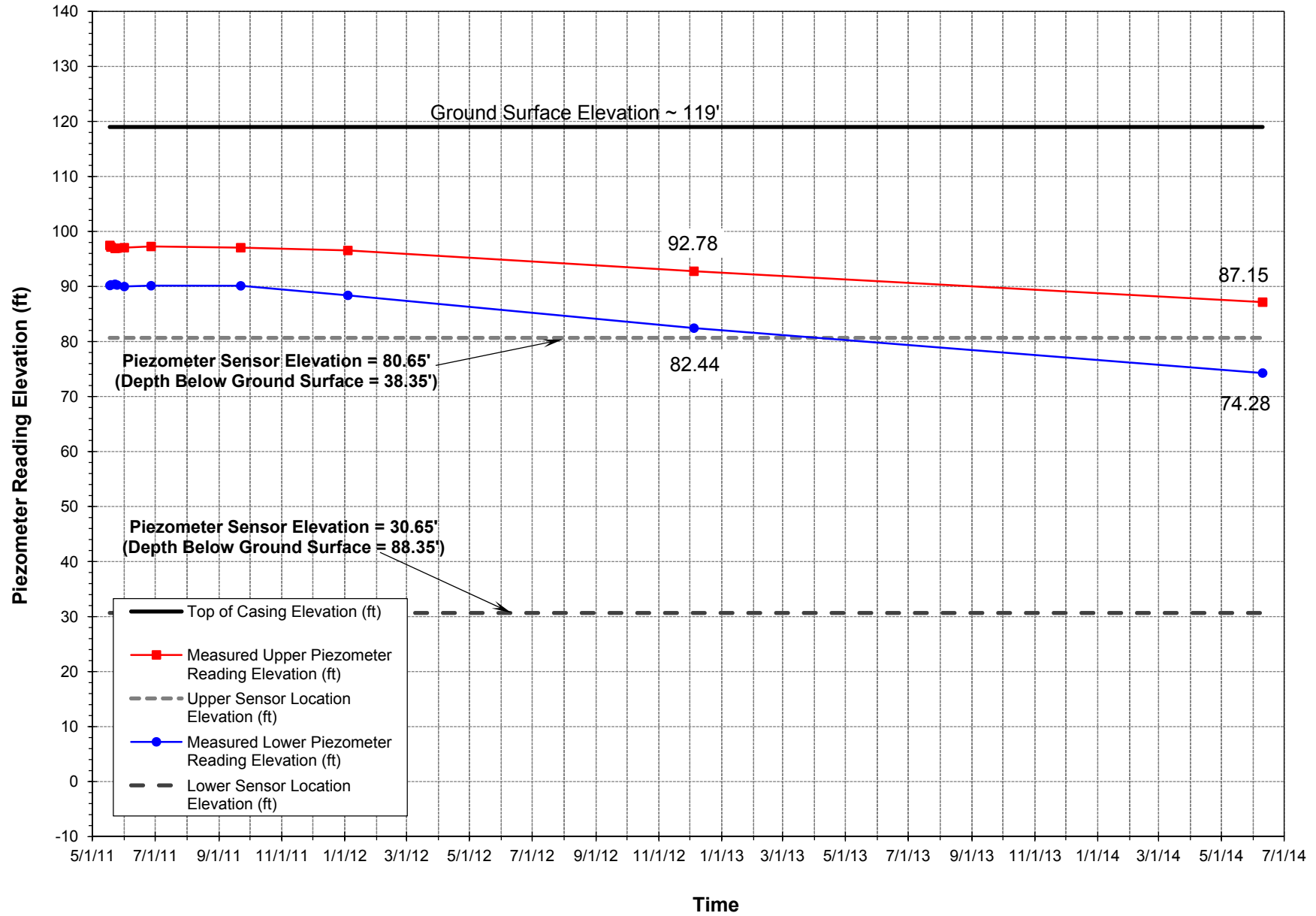
APPENDIX B

Piezometer Monitoring Reports (2011-2014), 1925 ECDLL, Santa Barbara

SI-1 Vibrating Wire Piezometers



SI-2 Vibrating Wire Piezometers



APPENDIX C

**Recommended Structural and Operational Storm Water Management BMPs,
Proposed Residential Reuse, Conservation, and Restoration Project, 1925 ECDLL,
Santa Barbara**

In the following appendix table, we list the recommended BMPs, the Sub-Catchment number to which they apply, their description, the area or diameter (if a pipe), elevations in and out of them and the outflow receiving device.

BMP #	SC #	STRUCTURAL/ OPERATIONAL BMP DESCRIPTION	AREA/ DIA.	ELEVATION IN OUT		OUTFLOW RECEIVING DEVICE
1	1	Cistern in ECDLL ROW (SC-1) below ECDLL pavement, with pipe for pumping excess storm water from WST-1, WST-3. <i>(Additional Recommendation to City to avoid water waste.)</i>	TBD	TBD	TBD	City FD/PWD uses.
2		Replacement of (E) curb and gutter with (N) curb and gutter in 1925 ECDLL ROW (SC-1), with excess water outflow pipe outfall(s) from WST-1, WST-2, and WST-3. Pipe at outfall to be fitted with automatic backup flow control valves. Curb with stenciled standard City “No Dumping” notice.	As Designed	Varies	Varies	ECDLL municipal storm drain.
3		Litter removal, as necessary, adjacent to 1925 ECDLL after each ECDLL curb-side garbage pick-up.	312 ft ²	Varies	Varies	ECDLL municipal storm drain.
4		Monthly gutter sweeping (in ECDLL ROW north of 1925 ECDLL).	18.75 ft ²	Varies	Varies	ECDLL municipal storm drain.

BMP #	SC #	STRUCTURAL/ OPERATIONAL BMP DESCRIPTION	AREA/ DIA.	ELEVATION		OUTFLOW RECEIVING DEVICE
				IN	OUT	
5	2	(N) Repavement of (E) 1925-1927 ECDLL driveway ramp in ECDLL ROW, (N) widening of adjacent 1925 ECDLL driveway ramp, both with (N) filter strip, and (N) restoration with horticultural native vegetation of the ECDLL ROW green strip (SC-2) adjacent to (east of) the widened 1925 ECDLL driveway ramp.	86 ft ²	Varies	Varies	ECDLL municipal storm drain.
6		(N) Dry Stand Pipe in ECDLL ROW green strip (SC-2), for City FD/PWD access to retained storm water in WST-1, WST 2	8 ft ²	TBD	TBD	City FD uses.
7		(N) Monthly driveway ramp filter strip maintenance.	10 ft ²	As De- signed	As De- signed	Collected filter strip debris to closed trash can in garage.
8	3	(N) Repavement of (E) 1925 ECDLL part of joint 1925- 1927 ECDLL driveway (SC-3, 1,029 ft ²) with flagstone pavers.	330 ft ²	Varies	Varies	DI CB3P.
9		(N) DI CB3P, with trash grate and sediment filter.		135.00	128.00	DJB 4.5.
10		(N) Monthly driveway sweeping.	330 ft ²	Varies	Varies	Collected debris to closed trash can in garage.
11	4	(N) Repavement of (E) 1925 ECDLL part of joint 1925- 1927 ECDLL driveway (SC-4) with flagstone pavers.	210 ft ²	Varies	Varies	TD CB4P.

BMP #	SC #	STRUCTURAL/ OPERATIONAL BMP DESCRIPTION	AREA/ DIA.	ELEVATION		OUTFLOW RECEIVING DEVICE
				IN	OUT	
12		(N) Monthly driveway sweeping.	210 ft ²	Varies	Varies	Collected debris to closed trash can in garage.
13	5	(N) TD CB4P, with trash grate, sediment filter, and 8-inch (v) East-West berm along south edge, to avoid discharge to downslope SC-5.	As De- signed	128.50	128.00	1921 Driveway.
14		(N) Restored Upper Private Open Space, with horticultural native vegetation and steps, 48 ft ² .	884 ft ²	127.00	119.00	DI CB5P.
15	6	(N) Widened 1925 ECDLL driveway on 1925 ECDLL (SC-6), with flagstone pavers and restored driveway berm at the SC-2/SC-6 boundary (≤ 4 inches above top of curb).	1,340 ft ²	Varies	Varies	DI CB6P.
16		(N) Restoration with horticultural native vegetation of the 1925 ECDLL driveway east side yard, with a restored crown at the SC-2/SC-6 boundary (min. 4 inches above top of curb).	275 ft ²	Varies	Varies	DI CB6P.
17		(N) 8-inch (v) Berm along the east side of the 1925 ECDLL widened driveway easterly side-yard (1925-1921 ECDLL PL).	108 ft ²	Varies	Varies	DI CB6P.
18		(N) Drain Inlet (DI) CB6P.	As De- signed	128.50	128.0	WST-1.
19		(N) Monthly driveway sweeping and DI maintenance.	1,340 ft ²	Varies	Varies	Collected debris to closed trash can in garage.

BMP #	SC #	STRUCTURAL/ OPERATIONAL BMP DESCRIPTION	AREA/ DIA.	ELEVATION		OUTFLOW RECEIVING DEVICE
				IN	OUT	
20	6	(N) Round Pipe Storage Subsurface Water Storage Tank (WST) 1, 1,018 cf (7,615 gallons), w/pump, primary and backup power, oil-grease separator, filtration, UVL water treatment.	D:108 in L: 16 ft	127.50	127.0	1. WST-2 (by gravity flow, when warranted). 2. Pumped by SBFD via Dry Stand Pipe (as needed in an emergency). 3. WST-3 (by gravity flow, when warranted). 4. Excess storm water pumped to BMP 1, City Cistern in ECDLL ROW (if available). 5. Excess storm water by gravity flow in DP P, to Drain Outfall P at SC-18/SC-19 boundary.
21	7	(N) DJB 4.5P	As De- signed	As De- signed	As De- signed	1921 Driveway.
22		(N) Drain Pipe Outfall in easterly Lower 1925 ECDLL Driveway RW.	As De- signed	As De- signed	As De- signed	SC-10 (1921 ECDLL).
23		(N) Trench Drain (TD) CB7, with trash grate and sediment filtration.	As De- signed	121.50	119.0	WST-2.
24		(N) Monthly driveway sweeping and TD maintenance.	653 ft ²	Varies	Varies	Collected debris to closed trash can in garage.
25	8	(N) Garage Entry Driveway, House Entry Pavement, Turnaround (SC-8).	958 ft ²	Varies	Varies	TD CB8.
26		(N) Trench Drain (TD) CB8, with trash grate and sediment filtration.	As De- signed	119.50	119.0	WST-2.

BMP #	SC #	STRUCTURAL/ OPERATIONAL BMP DESCRIPTION	AREA/ DIA.	ELEVATION		OUTFLOW RECEIVING DEVICE
				IN	OUT	
27	8	(N) Monthly driveway, entry, turnaround sweeping and TD maintenance.	958 ft ²	110.0	As De- signed	Collected debris to closed trash can in garage.
28		(N) Round Pipe Storage Subsurface Water Storage Tank (WST) 2, 1,909 cf (14,279 gallons), w/pump, primary and backup power, oil-grease separator, filtration, UVL water treatment.	D:108 in L: 30 ft			1. Non-potable water tank in house utility room (ABDS, Sheet A0.01, May, 2015). 2. WST-1 (by pumped flow, when warranted). 3. WST-3 (by gravity flow, when warranted). 4. Excess storm water pumped to BMP 1, City Cistern in ECDLL ROW (if available). 5. Excess storm water by gravity flow in DP P, to Drain Outfall P at SC-18/SC-19 boundary. 6. Excess storm water pumped to drain outfalls in ECDLL curb to municipal storm drain gutter.
29	11	(N) Restored Upper West Side yard (SC-11), with flow line, walkway, horticultural native vegetation plantings.	500 ft ²	Varies	Varies	DI CB 11P.
30		(N) DI CB 11P.	As De- signed			WST-3.
31	12	(N) Restored Upper East Side Yard (SC-12), with flow line, steps from SC-8, walkway, horticultural native vegetation plantings.	413 ft ²	Varies	Varies	DI CB 12P.
32		(N) DI CB 12P.	As De- signed			WST-3.
33	13	(N) North-draining Roof of House Foyer/Entry and Garage, and Foyer Deck.	1,245 ft ²	119.0	118.50	DI(s) CB 13P.

BMP #	SC #	STRUCTURAL/ OPERATIONAL BMP DESCRIPTION	AREA/ DIA.	ELEVATION		OUTFLOW RECEIVING DEVICE
				IN	OUT	
34		(N) DI(s) CB 13.	As De- signed	As De- signed	As De- signed	WST-2
35	14	(N) South-draining Roof of House, w/Green Roof (West and East Planters, Solar 2H ² O a/o PV Cells).	945 ft ²	As De- signed	As De- signed	DI(s) CB 14,
36	15	(N) DI(s) CB 14.	As De- signed	As De- signed	As De- signed	WST-3
37		(N) Lower House Level Patio, with Steps to/from House, Lap Pool.	461 ft ²	As De- signed	As De- signed	Patio Deck and House- Patio Steps: DI(s) CB 15P. Lap Pool: Direct.
38		DI(s) CB 15P.	As De- signed	As De- signed	As De- signed	WST-3
39		(N) Box Pipe Storage Subsurface Water Storage Tank (WST) 3, W: 96 in; H: 96 in; L: 30 ft; 1,920 cf (14,362 gallons), w/pump, primary and backup power, oil-grease separator, filtration, UVL water treatment.	240 ft ²	87.0	95.0	1. WST-2 (by pumped flow, when warranted). 2. WST-1 (by pumped flow, when warranted). 3. Excess storm water pumped to BMP 1, City Cistern in ECDLL ROW (if available). 4. Excess storm water by gravity flow in DP_P, to Drain Outfall P at SC-18/SC-19 boundary. 5. Excess storm water pumped to drain outfalls in ECDLL curb to municipal storm drain gutter.
40	16	(N) Sub-surface 2° horizontal drains (3), with connector pipe, below SC's 5, 7, 8, 11, 12, 14, 15, 17.	1-1/2"	As De- signed	As De- signed	WST 3.
41	17	(N) Restored Temporary Construction Bench/ Lower Private Open Space, with Lower West and East Side Yards, Steps from Lower Patio, Horticultural Native Vegetation Plantings, Flow Lines.	1,516 ft ²	As De- signed	As De- signed	Flow Lines, in-situ and to SC-18 boundary.

BMP #	SC #	STRUCTURAL/ OPERATIONAL BMP DESCRIPTION	AREA/ DIA.	ELEVATION		OUTFLOW RECEIVING DEVICE
				IN	OUT	
42	18	(N) Horticultural Lemonade Berry Mitigation Area/ Restored City (1978) Toe of Grading Area	590 ft ²	As De- signed	As De- signed	Flow Lines, in-situ and to SC-19 boundary.
43		(N) Multi-port outfall, w/energy dissipation, along SC-18/SC-19 boundary of excess storm water from WST-1, -2, and/or -3.	As De- signed	As De- signed	As De- signed	Contiguous Lemonade Berry Shrubs (SC-19)
44	19	(E) Contiguous Lemonade Berry Shrubs/Proposed Open Space OTD	6,361 ft ²	As De- signed	As De- signed	In-situ.
45		(N) Seasonal Earthen Material Water Bars (8) in Re-vegetating/ Closing Surveyor's Path (2005/6)	80 ft ²	As De- signed	As De- signed	In-situ and to 1927 ECDLL per Doolittle (1984) grading.
46	20	(E) Coastal Bluff/Proposed Open Space OTD (inclusive of BMP 42 area)	1,658 ft ²	52 ft	11 ft	In-situ and back beach cobble-sand area (SC-21).
47		(N) Temporary upper NW coastal bluff face restoration (transient trespass erosion area)	±50 ft ²	51 ft	44 ft	In-situ and to back beach cobble-sand area (SC-21).
48	21	(E) Back Beach (SC-21, Base of Coastal Bluff to MHTL [SLC])	2,110 ft ²	11 ft	±4 ft	In-situ and to receiving waters of the Santa Barbara Channel of the Pacific Ocean.
49	3-20	(N) Annual Pre-October 1 Inspection and Maintenance/ Repair of all SWMS components.	See BMPs 1-48	See BMPs 1-48	See BMPs 1-48	See BMPs 1-48

BMP #	SC #	STRUCTURAL/ OPERATIONAL BMP DESCRIPTION	AREA/ DIA.	<u>ELEVATION</u>		OUTFLOW RECEIVING DEVICE
				IN	OUT	
50	3-2	(N) Monitoring and Reporting to City of WST and SWMS performance within 5 business days after (a) ≥ 100 year recurrence 24 hour rain event at SB County Station 234, or (b) local/regional seismic event $\geq 6.0M$.	NA	NA	NA	NA

APPENDIX D

California Coastal Commission Standard “Special Condition” Storm Water Management Criteria

In this Appendix, we set forth the California Coastal Commission's (CCC's) drainage and runoff control criteria for storm water management by approved regulatory development (including grading) in the coastal zone.¹

A. Drainage and Runoff Control Plan

The CCC requires that these criteria be addressed in a "Drainage and Runoff Control Plan" that is prepared by a qualified licensed professional, who shall certify in writing that the final Drainage and Runoff Control Plan is in substantial conformance with the following minimum requirements:

(1) Projects shall incorporate Low Impact Development (LID) techniques in order to minimize storm water quality and quantity impacts from development, unless a credible and compelling explanation is provided as to why such features are not feasible and/or appropriate. LID strategies use small-scale integrated and distributed management practices, including minimizing impervious surfaces, infiltrating storm water close to its source, and preservation of permeable soils and native vegetation.

(2) Post-development runoff rates from the site shall be maintained at levels similar to pre-development conditions.

(3) Selected BMPs shall consist, or primarily consist, of site design elements and/or landscape based systems or features that serve to maintain site permeability, avoid directly connected impervious areas and/or retain, infiltrate, or filter runoff from rooftops, driveways and other hardscape areas, where feasible. Examples of such features include but are not limited to porous pavement, pavers, rain gardens, vegetated swales, infiltration trenches and cisterns.

(4) Landscape plants shall have low water and chemical treatment demands and be consistent with Coastal Commission Landscaping and Fuel Modification Plan requirements.

¹ The California Coastal Act, at Public Resources Code section 30106, defines "development" in the coastal zone to mean "on land, in or under water, the placement or erection of any solid material or structure; discharge or disposal of any dredged material or of any gaseous, liquid, solid, or thermal waste; grading, removing, dredging, mining, or extraction of any materials; change in the density or intensity of use of land, including, but not limited to, subdivision pursuant to the Subdivision Map Act (commencing with Section 66410 of the Government Code), and any other division of land, including lot splits, except where the land division is brought about in connection with the purchase of such land by a public agency for public recreational use; change in the intensity of use of water, or of access thereto; construction, reconstruction, demolition, or alteration of the size of any structure, including any facility of any private, public, or municipal utility; and the removal or harvesting of major vegetation other than for agricultural purposes, kelp harvesting, and timber operations which are in accordance with a timber harvesting plan submitted pursuant to the provisions of the Z'berg-Nejedly Forest Practice Act of 1973 (commencing with Section 4511). As used in this section, "structure" includes, but is not limited to, any building, road, pipe, flume, conduit, siphon, aqueduct, telephone line, and electrical power transmission and distribution line."

An efficient irrigation system designed based on hydro-zones and utilizing drip emitters or micro-sprays or other efficient design shall be utilized for any landscaping requiring water application.

(5) All slopes shall be stabilized in accordance with provisions contained in the Coastal Commission Landscaping and/or Interim Erosion and Sediment Control Conditions and, if applicable, in accordance with engineered plans prepared by a qualified licensed professional.

(6) Runoff shall be discharged from the developed site in a non-erosive manner. Energy dissipating measures shall be installed where needed to prevent erosion. Plan details and cross sections for any rock rip-rap and/or other energy dissipating devices or structures associated with the drainage system shall be prepared by a qualified licensed professional. The drainage plans shall specify the location, dimensions, cubic yards of rock, etc. for any velocity reducing structure with the supporting calculations showing the sizing requirements and how the device meets those sizing requirements. The qualified, licensed professional shall ensure that all energy dissipaters use the minimum amount of rock and/or other hardscape necessary to protect the site from erosion.

(7) All BMPs shall be operated, monitored, and maintained in accordance with manufacturer's specifications where applicable, or in accordance with well recognized technical specifications appropriate to the MBP for the life of the project and at a minimum, all structural BMPs shall be inspected, cleaned out, and where necessary, repaired prior to the onset of the storm season (October 15th each year) and at regular intervals as necessary between October 15 and May 15th of each year. Debris and other water pollutants removed from structural BMP(s) during clean-out shall be contained and disposed of in a proper manner.

(8) For projects located on a hillside, slope, or which may otherwise be prone to geologic instability, site drainage and BMP selection shall be developed concurrent with the preliminary development design and grading plan, and final drainage plans shall be approved by a licensed geotechnical engineer or engineering geologist.

(9) Should any of the project surface or subsurface drainage/filtration structures or other BMPs fail or result in increased erosion, the applicant/landowner or successor-in-interest shall be responsible for any necessary repairs to the drainage/filtration system or BMPs and restoration of the affected area. Should repairs or restoration become necessary, prior to the commencement of such repair or restoration work, the applicant shall submit a repair and restoration plan for determination if an amendment to the project CDP, or new coastal development permit, is required to authorize such work.

B. Conformity of the Drainage and Runoff Control Plan to the Project Site/Development Plans

In addition, the CCC requires that a final Drainage and Runoff Control Plan shall conform to the approved site/development plans. Any necessary changes to the approved site/development plans required by a qualified, licensed professional shall be reported to the City (as responsible primary LCP implementing agency). No significant changes to the approved final site/development plans shall occur without an amendment to the coastal development permit, unless it is determined that no amendment is required.

Appendix C of this Hydrology Report itemizes CSA's recommended site design, source control, and treatment control BMP's, which specifically (feasibly) implement CCC's storm water management regulatory criteria at the subject parcel and to the proposed development project. CSA recommends that, as applicable, CCC's typical special storm water management conditions of approved development be verbatim incorporated into project building and grading/drainage plans as general notes.

C. Project Grading/Construction Interim Erosion Control Plan

The Coastal Commission further requires development in the coastal zone to be accompanied by an "Interim Erosion Control Plan" during project grading and construction, and by clearly delineated construction responsibilities. Prior to coastal development permit issuance, the CDP applicant is required to submit an "Interim Erosion Control and Construction Best Management Practices Plan" that has been prepared by a qualified, licensed professional, who shall certify in writing that the Interim Erosion Control and Construction Best Management Practices (BMPs) plan are in conformance with the following requirements:

(1) The Erosion Control Plan shall:

- (a) Delineate the areas to be disturbed by grading or construction activities and shall include any temporary access roads, staging areas and stockpile areas. The natural areas on the site shall be clearly delineated on the plan and on-site with fencing or survey flags.
- (b) Include a narrative report describing all temporary run-off and erosion control measures to be used during construction.
- (c) Identify and delineate on a site or grading plan the locations of all temporary erosion control measures.
- (d) Specify that grading shall take place only during the dry season (May 1 – October 31). This period may be extended for a limited period of time if the situation warrants such a limited extension, if approved. The applicant shall

install or construct temporary sediment basins (including debris basins, de-silting basins, or silt traps), temporary drains and swales, sand bag barriers, silt fencing, and shall stabilize any stockpiled fill with geo-fabric covers or other appropriate cover, install geotextiles or mats on all cut or fill slopes, and close and stabilize open trenches as soon as possible. Basins shall be sized to handle not less than a 10 year, 6 hour duration rainfall intensity event.

(e) The erosion control measures shall be required on the project site prior to or concurrent with the initial grading operations and maintained throughout the development process to minimize erosion and sediment from runoff waters during construction. All sediment should be retained on-site, unless removed to an appropriate, approved dumping location either outside of the coastal zone or within the coastal zone to a site permitted to receive fill.

(f) Also include temporary erosion control measures should grading or site preparation cease for a period of more than 30 days, including but not limited to: stabilization of all stockpiled fill, access roads, disturbed soils and cut and fill slopes with geotextiles and/or mats, sand bag barriers, silt fencing; temporary drains and swales and sediment basins. The plans shall also specify that all disturbed areas shall be seeded with native grass species and include the technical specifications for seeding the disturbed areas. These temporary erosion control measures shall be monitored and maintained until grading or construction operations resume.

(g) All temporary, construction related erosion control materials shall be comprised of bio-degradable materials (natural fiber, not photo-degradable plastics) and must be removed when permanent erosion control measures are in place. Bio-degradable erosion control materials may be left in place if they have been incorporated into the permanent landscaping design.

(2) Construction Best Management Practices (BMPs):

(a) No demolition or construction materials, debris, or waste shall be placed or stored where it may enter sensitive habitat, receiving waters or a storm drain, or be subject to wave, wind, rain, or tidal erosion and dispersion.

(b) No demolition or construction equipment, materials, or activity shall be placed in or occur in any location that would result in impacts to environmentally sensitive habitat areas, streams, wetlands or their buffers.

(c) Any and all debris resulting from demolition or construction activities shall be removed from the project site within 24 hours of completion of the project.

(d) Demolition or construction debris and sediment shall be removed from work areas each day that demolition or construction occurs to prevent the accumulation of sediment and other debris that may be discharged into coastal waters.

(e) All trash and debris shall be disposed in the proper trash and recycling receptacles at the end of every construction day.

(f) The applicant shall provide adequate disposal facilities for solid waste including excess concrete produced during demolition or construction.

(g) Debris shall be disposed of at a permitted disposal site or recycled at a permitted recycling facility. If the disposal site is located in the coastal zone, a coastal development permit or an amendment to this permit shall be required before disposal can take place unless a determination is made that no amendment or new permit is legally required.

(h) All stock piles and construction materials shall be covered, enclosed on all sides, shall be located as far away as possible from drain inlets and any waterway, and shall not be stored in contact with the soil.

(i) Machinery and equipment shall be maintained and washed in confined areas specifically designed to control runoff. Thinners or solvents shall not be discharged into sanitary or storm sewer systems.

(j) The discharge of any hazardous materials into any receiving waters shall be prohibited.

(k) Spill prevention and control measures shall be implemented to ensure the proper handling and storage of petroleum products and other construction materials. Measures shall include a designated fueling and vehicle maintenance area, with appropriate berms and protection, to prevent any spillage of gasoline or related petroleum products or contact with runoff. The area shall be located as far away from the receiving waters and storm drain inlets as possible.

(l) Best Management Practices (BMPs) and Good Housekeeping Practices (GHPs) designed to prevent spillage and/or runoff of demolition or construction-related materials, and to contain sediment or contaminants associated with demolition or construction activity, shall be implemented prior to the on-set of such activity.

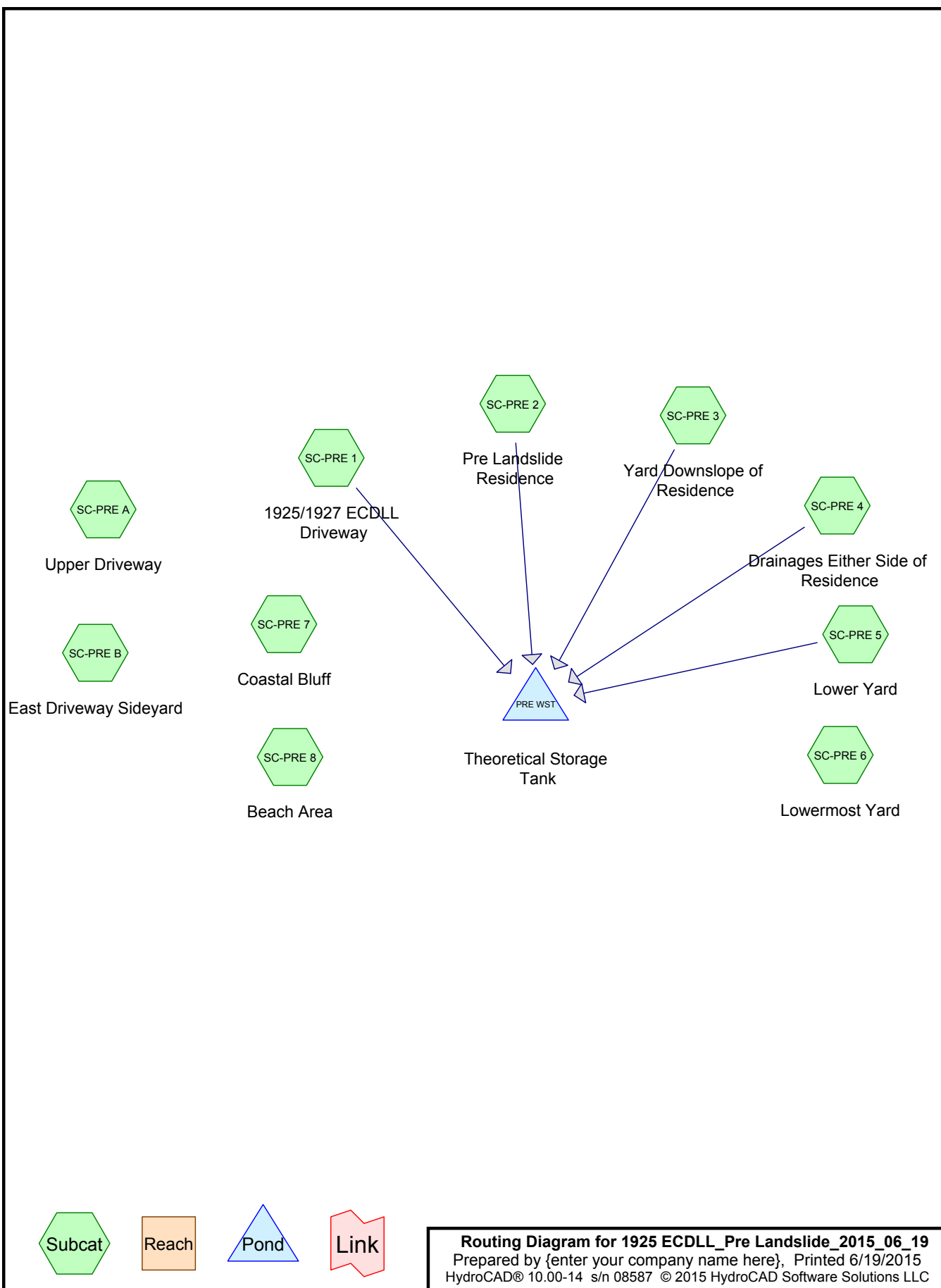
(m) All BMPs shall be maintained in a functional condition throughout the duration of construction activity.

The final Interim Erosion Control and Construction Best Management Practices Plan shall be in conformance with the site/development plans approved by the City. Any necessary changes to the approved site/development plans required by a qualified, licensed professional shall be reported to the responsible City official. No significant changes to the approved final site/development plans shall occur without an amendment to the coastal development permit, unless the responsible City official determines that no amendment is required.

CSA will review the project civil engineer's Drainage and Erosion Control Plan that implements our recommendations prior to project application submittal to the City, and provide a separate letter regarding our concurrence with those plan sheets and notes.

APPENDIX E

**HydroCAD Quantitative Analysis for Pre-1978 ECDLL Landslide, 25-Year, 24-Hour,
6.71-Inch Rainfall Event at 1925 ECDLL, Santa Barbara**



1925 ECDLL_Pre Landslide_2015_06_19

Prepared by {enter your company name here}

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
11,529	68	<50% Grass cover, Poor, HSG A (SC-PRE 3, SC-PRE 5, SC-PRE 6, SC-PRE B)
2,868	48	Brush, Poor, HSG A (SC-PRE 7)
874	83	Brush, Poor, HSG D (SC-PRE 8)
1,224	98	Paved roads w/curbs & sewers, HSG A (SC-PRE A)
740	83	Paved roads w/open ditches, 50% imp, HSG A (SC-PRE 4)
2,088	98	Roofs, HSG A (SC-PRE 2)
2,084	98	Unconnected pavement, HSG A (SC-PRE 1)
219	98	Unconnected pavement, HSG D (SC-PRE 8)
21,626	74	TOTAL AREA

1925 ECDLL_Pre Landslide_2015_06_19

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
20,533	HSG A	SC-PRE 1, SC-PRE 2, SC-PRE 3, SC-PRE 4, SC-PRE 5, SC-PRE 6, SC-PRE 7, SC-PRE A, SC-PRE B
0	HSG B	
0	HSG C	
1,093	HSG D	SC-PRE 8
0	Other	
21,626		TOTAL AREA

1925 ECDLL_Pre Landslide_2015_06_19

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
11,529	0	0	0	0	11,529	<50% Grass cover, Poor
2,868	0	0	874	0	3,742	Brush, Poor
1,224	0	0	0	0	1,224	Paved roads w/curbs & sewers
740	0	0	0	0	740	Paved roads w/open ditches, 50% imp
2,088	0	0	0	0	2,088	Roofs
2,084	0	0	219	0	2,303	Unconnected pavement
20,533	0	0	1,093	0	21,626	TOTAL AREA

1925 ECDLL_Pre Landslide_2015_06_19

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	PRE WST	85.00	75.00	100.0	0.1000	0.010	8.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-PRE 1: 1925/1927 Runoff Area=2,084 sf 100.00% Impervious Runoff Depth>0.79"
Flow Length=100' Slope=0.0300 '/' Tc=3.0 min CN=0/98 Runoff=0.03 cfs 137 cf

Subcatchment SC-PRE 2: Pre Landslide Runoff Area=2,088 sf 100.00% Impervious Runoff Depth>0.79"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.03 cfs 138 cf

Subcatchment SC-PRE 3: Yard Downslope of Runoff Area=1,858 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=45' Slope=0.4000 '/' Tc=3.0 min CN=68/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-PRE 4: Drainages Either Runoff Area=740 sf 50.00% Impervious Runoff Depth>0.40"
Flow Length=1' Tc=3.0 min CN=68/98 Runoff=0.00 cfs 24 cf

Subcatchment SC-PRE 5: Lower Yard Runoff Area=1,338 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=25' Slope=0.1900 '/' Tc=3.0 min CN=68/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-PRE 6: Lowermost Yard Runoff Area=6,760 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=145' Slope=0.1900 '/' Tc=3.0 min CN=68/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-PRE 7: Coastal Bluff Runoff Area=2,868 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=35' Slope=1.0000 '/' Tc=3.0 min CN=48/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-PRE 8: Beach Area Runoff Area=1,093 sf 20.04% Impervious Runoff Depth>0.26"
Flow Length=35' Slope=0.2100 '/' Tc=3.0 min CN=83/98 Runoff=0.00 cfs 24 cf

Subcatchment SC-PRE A: Upper Driveway Runoff Area=1,224 sf 100.00% Impervious Runoff Depth>0.79"
Flow Length=116' Slope=0.0300 '/' Tc=3.0 min CN=0/98 Runoff=0.02 cfs 81 cf

Subcatchment SC-PRE B: East Driveway Runoff Area=1,573 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=196' Slope=0.0700 '/' Tc=4.2 min CN=68/0 Runoff=0.00 cfs 0 cf

Pond PRE WST: Theoretical Storage Tank Peak Elev=82.30' Storage=299 cf Inflow=0.06 cfs 299 cf
8.0" Round Culvert n=0.010 L=100.0' S=0.1000 '/' Outflow=0.00 cfs 0 cf

Total Runoff Area = 21,626 sf Runoff Volume = 404 cf Average Runoff Depth = 0.22"
72.32% Pervious = 15,641 sf 27.68% Impervious = 5,985 sf

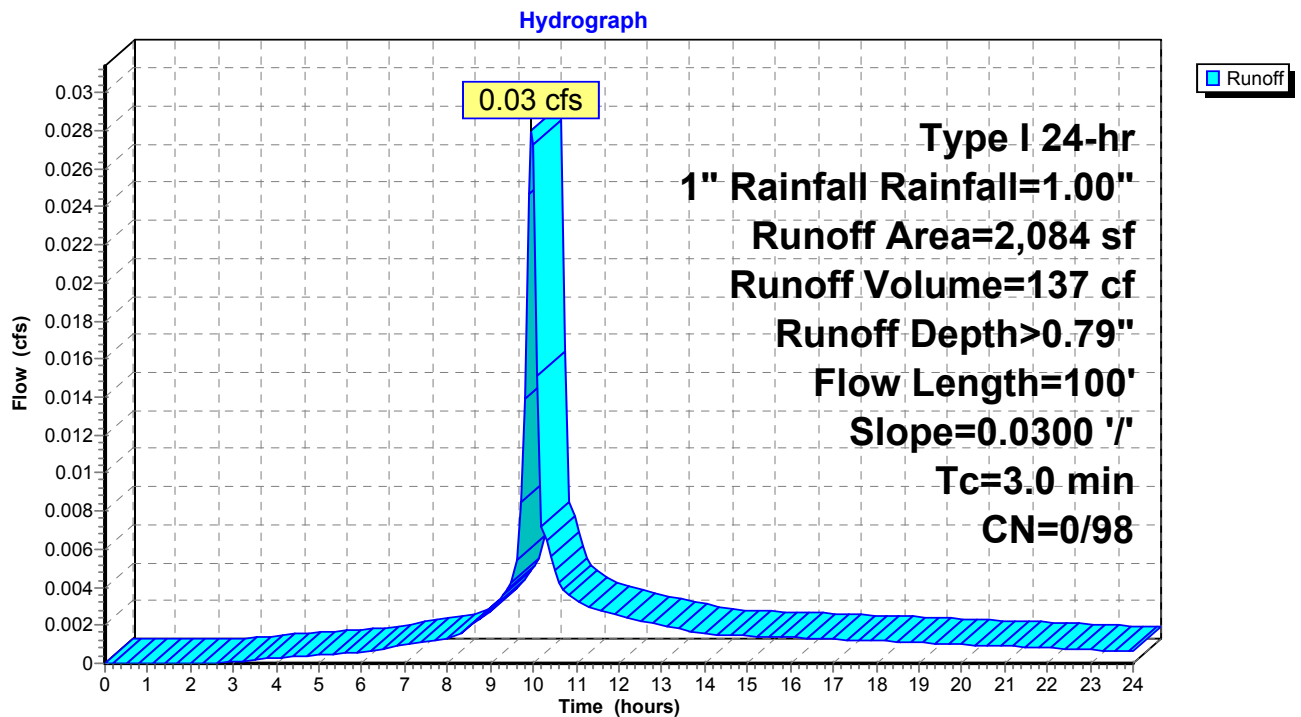
Summary for Subcatchment SC-PRE 1: 1925/1927 ECDLL Driveway[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.03 cfs @ 9.97 hrs, Volume= 137 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
Type I 24-hr 1" Rainfall Rainfall=1.00"

Area (sf)	CN	Description
2,084	98	Unconnected pavement, HSG A
2,084	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	100	0.0300	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.0	100	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 1: 1925/1927 ECDLL Driveway

Summary for Subcatchment SC-PRE 2: Pre Landslide Residence[49] Hint: $T_c < 2dt$ may require smaller dt

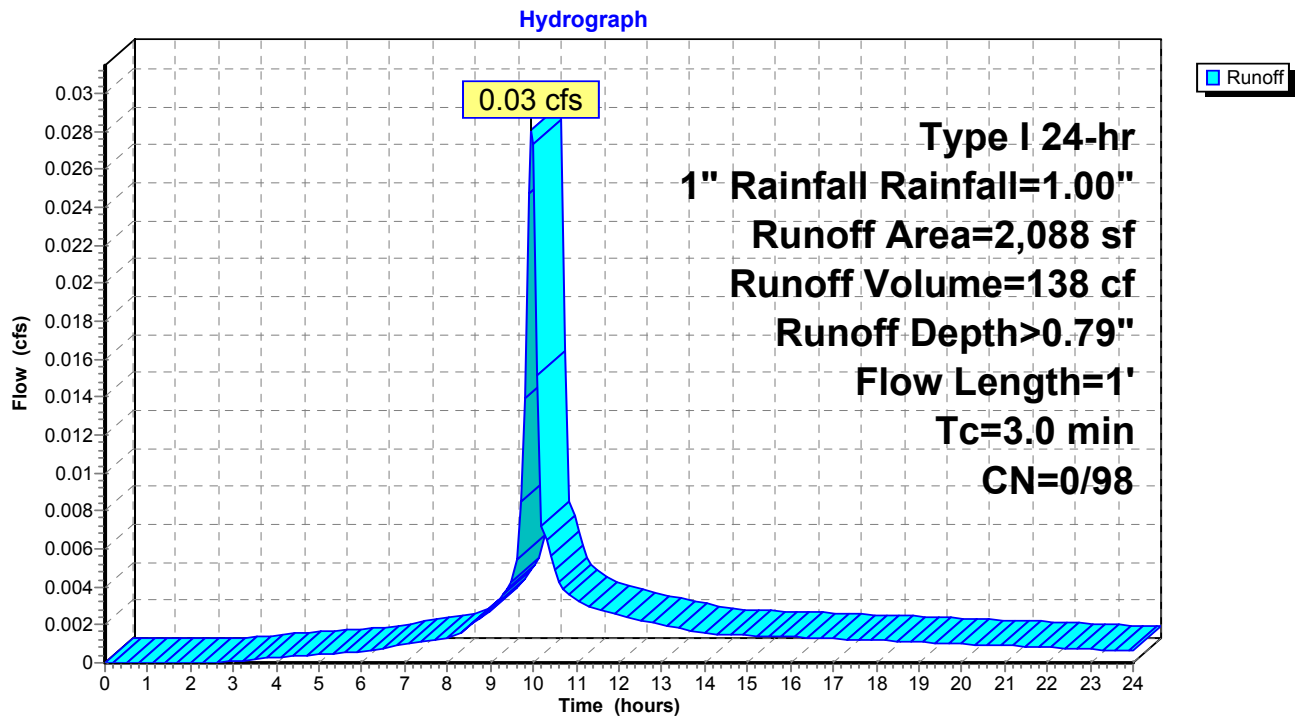
Runoff = 0.03 cfs @ 9.97 hrs, Volume= 138 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs

Type I 24-hr 1" Rainfall Rainfall=1.00"

Area (sf)	CN	Description
2,088	98	Roofs, HSG A
2,088	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 2: Pre Landslide Residence

Summary for Subcatchment SC-PRE 3: Yard Downslope of Residence[49] Hint: $T_c < 2dt$ may require smaller dt

[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs

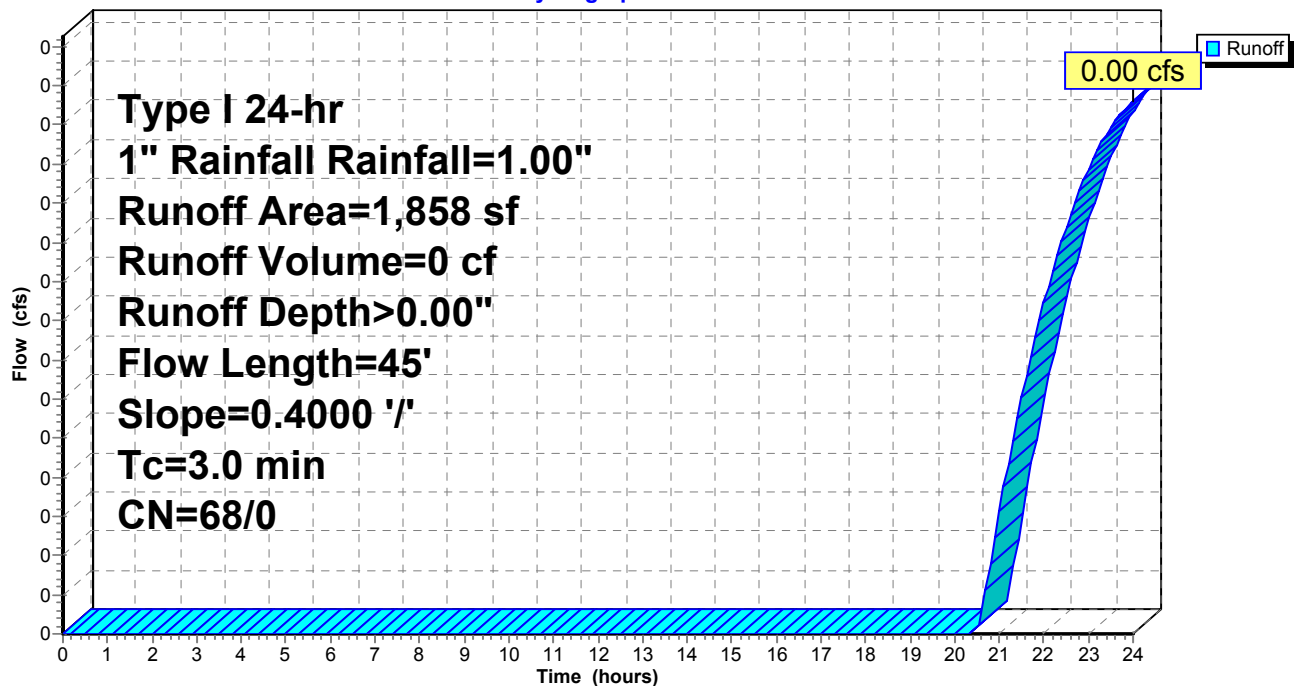
Type I 24-hr 1" Rainfall Rainfall=1.00"

Area (sf)	CN	Description
1,858	68	<50% Grass cover, Poor, HSG A
1,858	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	45	0.4000	1.16		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.6	45	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 3: Yard Downslope of Residence

Hydrograph



Summary for Subcatchment SC-PRE 4: Drainages Either Side of Residence[49] Hint: $T_c < 2dt$ may require smaller dt

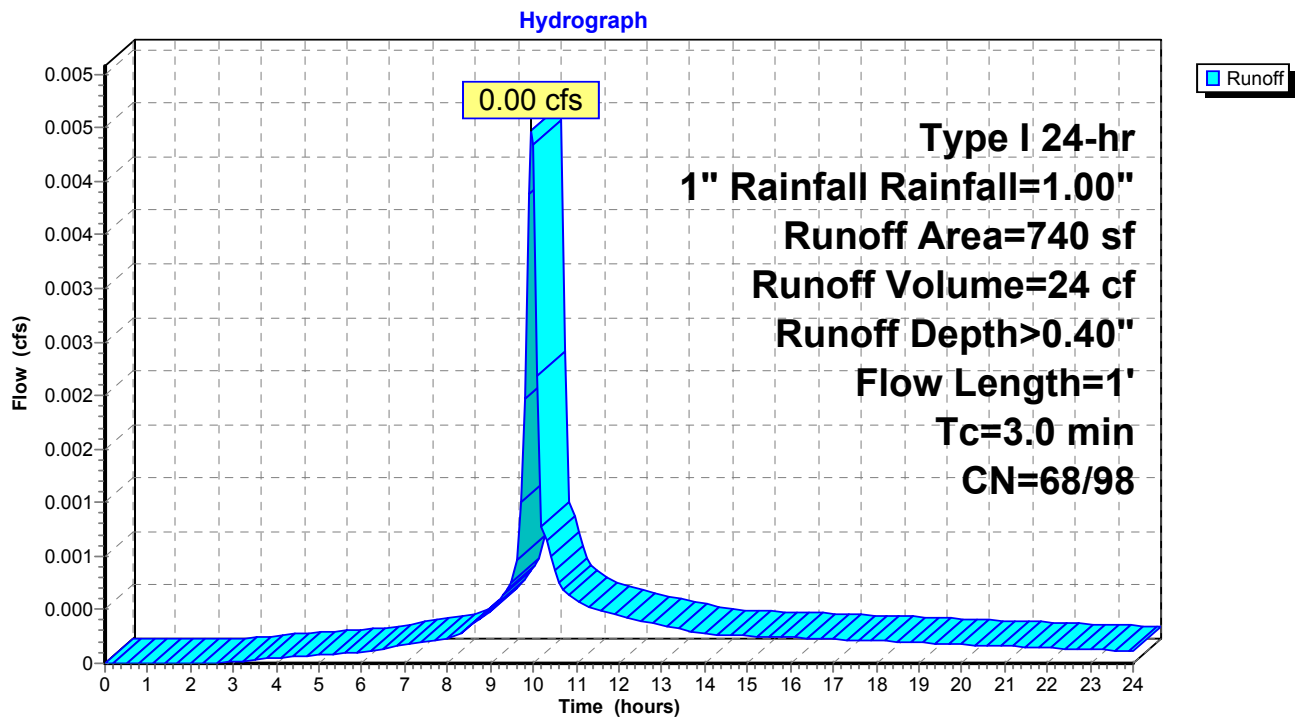
Runoff = 0.00 cfs @ 9.97 hrs, Volume= 24 cf, Depth> 0.40"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs

Type I 24-hr 1" Rainfall Rainfall=1.00"

Area (sf)	CN	Description
740	83	Paved roads w/open ditches, 50% imp, HSG A
370	68	50.00% Pervious Area
370	98	50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 4: Drainages Either Side of Residence

Summary for Subcatchment SC-PRE 5: Lower Yard[49] Hint: $T_c < 2dt$ may require smaller dt

[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs

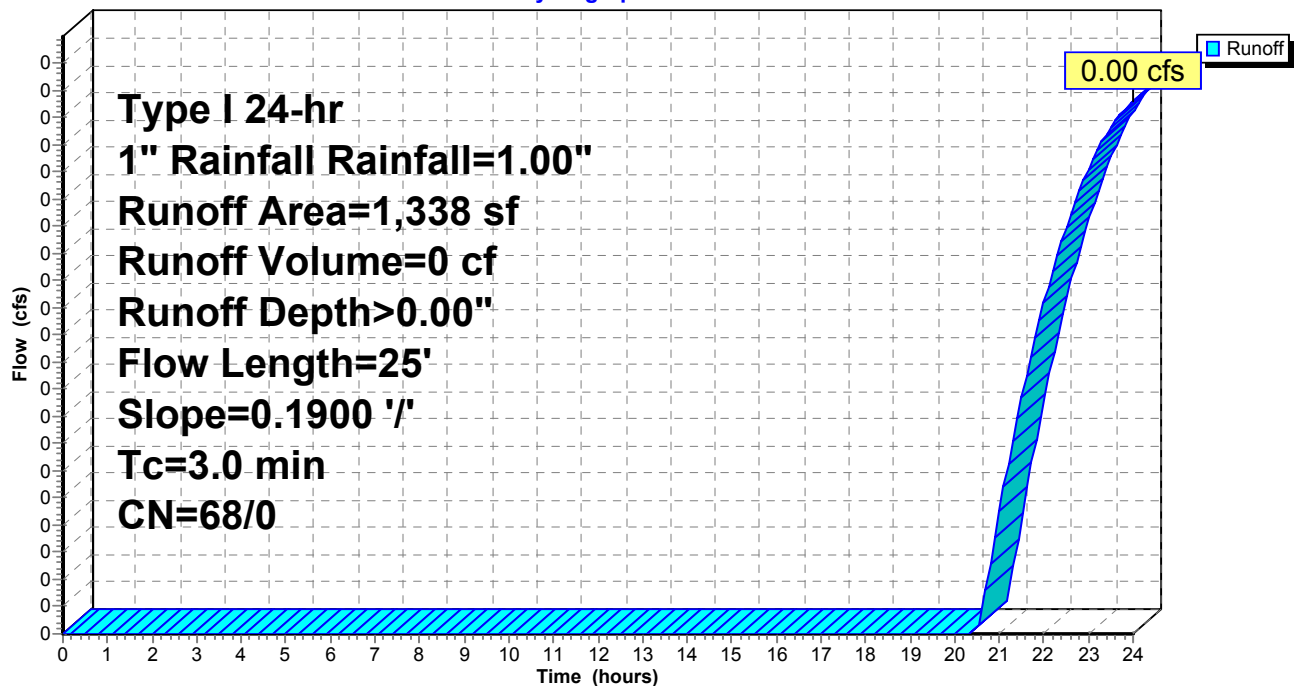
Type I 24-hr 1" Rainfall Rainfall=1.00"

Area (sf)	CN	Description
1,338	68	<50% Grass cover, Poor, HSG A
1,338	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.1900	0.76		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 5: Lower Yard

Hydrograph



Summary for Subcatchment SC-PRE 6: Lowermost Yard[49] Hint: $T_c < 2dt$ may require smaller dt

[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs

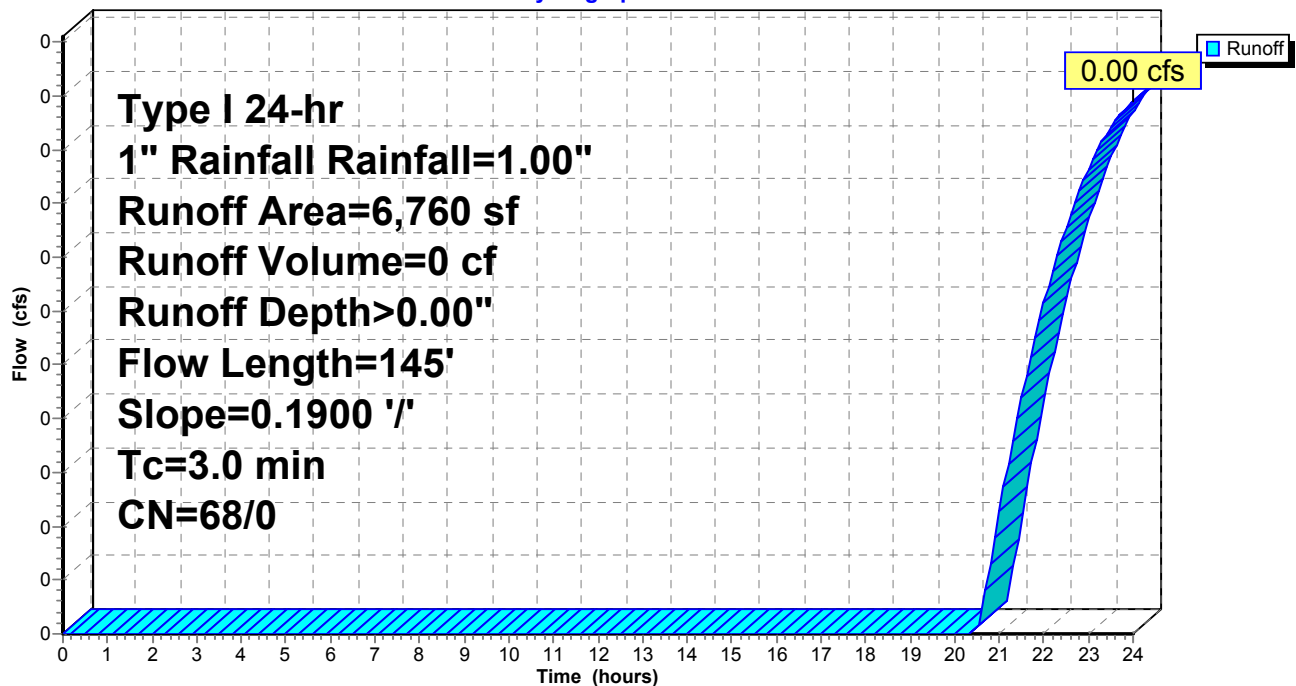
Type I 24-hr 1" Rainfall Rainfall=1.00"

Area (sf)	CN	Description
6,760	68	<50% Grass cover, Poor, HSG A
6,760	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	145	0.1900	1.09		Sheet Flow, Fallow n= 0.050 P2= 3.20"
2.2	145	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 6: Lowermost Yard

Hydrograph



Summary for Subcatchment SC-PRE 7: Coastal Bluff[49] Hint: $T_c < 2dt$ may require smaller dt

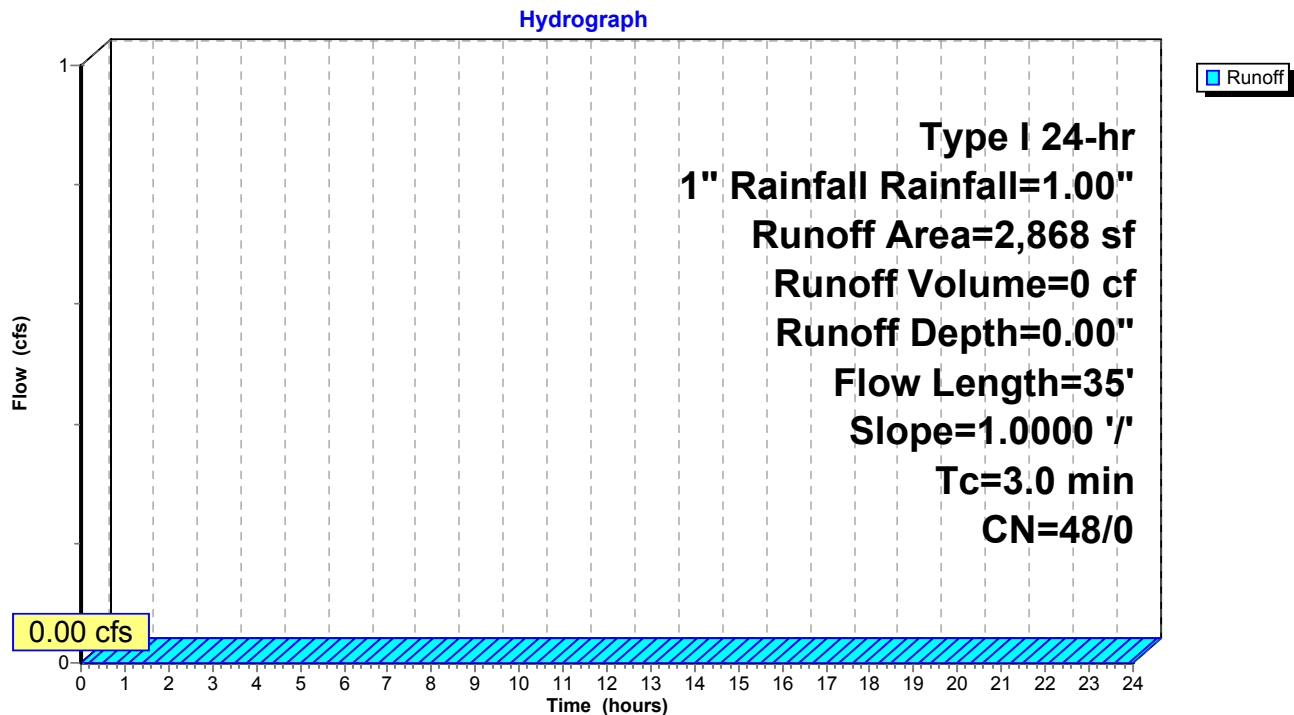
[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
Type I 24-hr 1" Rainfall Rainfall=1.00"

Area (sf)	CN	Description
2,868	48	Brush, Poor, HSG A
2,868	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 7: Coastal Bluff

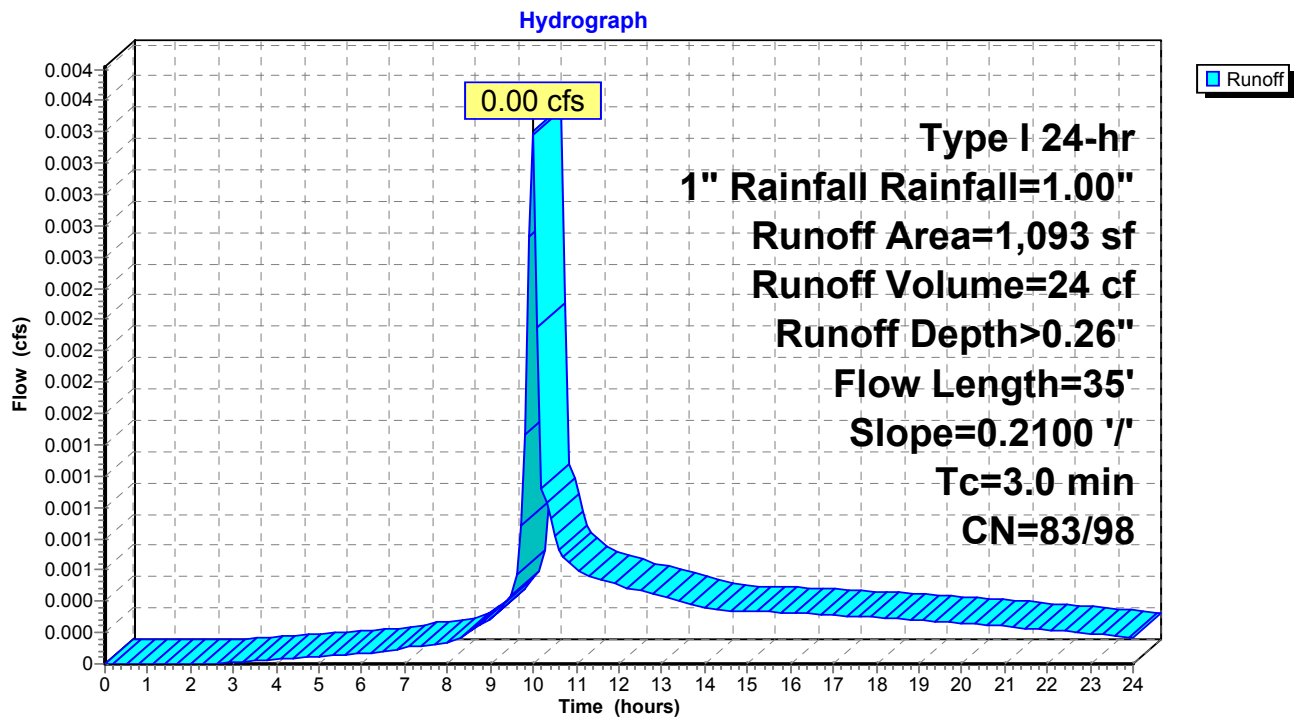
Summary for Subcatchment SC-PRE 8: Beach Area[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.00 cfs @ 9.98 hrs, Volume= 24 cf, Depth> 0.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
Type I 24-hr 1" Rainfall Rainfall=1.00"

Area (sf)	CN	Description
874	83	Brush, Poor, HSG D
219	98	Unconnected pavement, HSG D
1,093	86	Weighted Average
874	83	79.96% Pervious Area
219	98	20.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.7	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 8: Beach Area

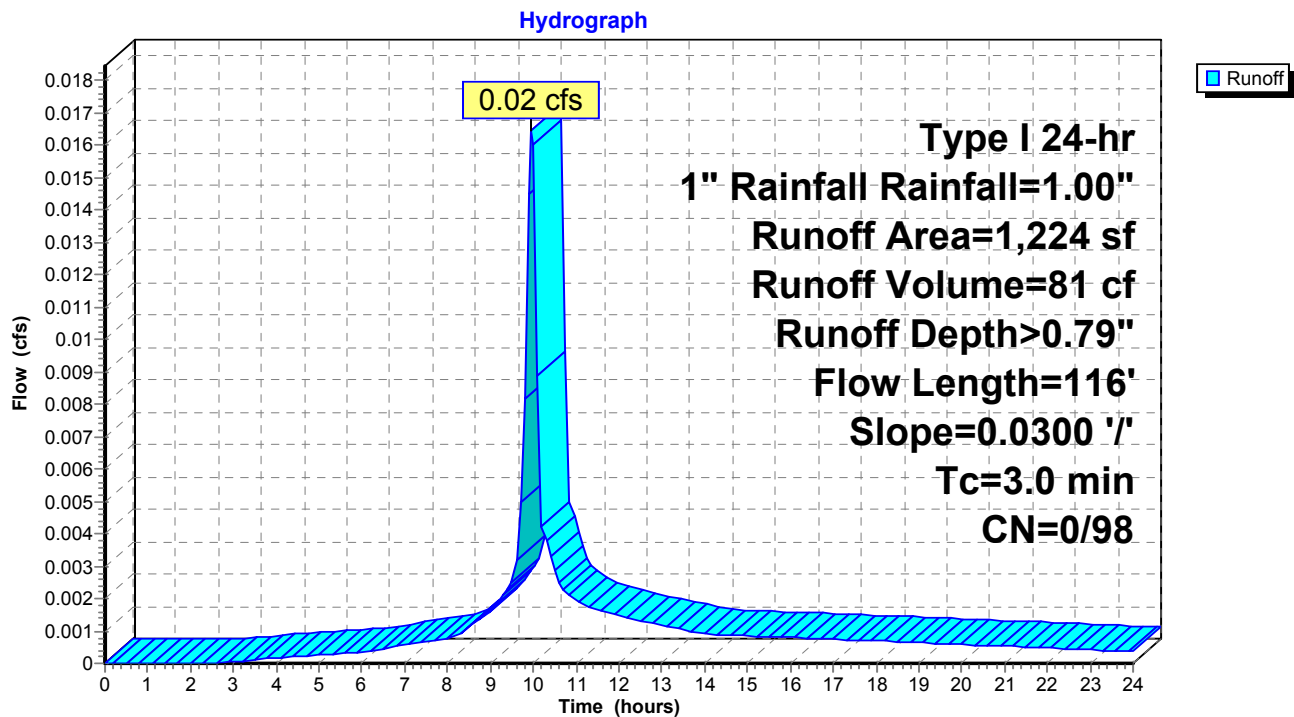
Summary for Subcatchment SC-PRE A: Upper Driveway[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.02 cfs @ 9.97 hrs, Volume= 81 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
Type I 24-hr 1" Rainfall Rainfall=1.00"

Area (sf)	CN	Description
1,224	98	Paved roads w/curbs & sewers, HSG A
1,224	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	116	0.0300	1.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.2	116	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE A: Upper Driveway

Summary for Subcatchment SC-PRE B: East Driveway Sideyard[49] Hint: $T_c < 2dt$ may require smaller dt

[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs

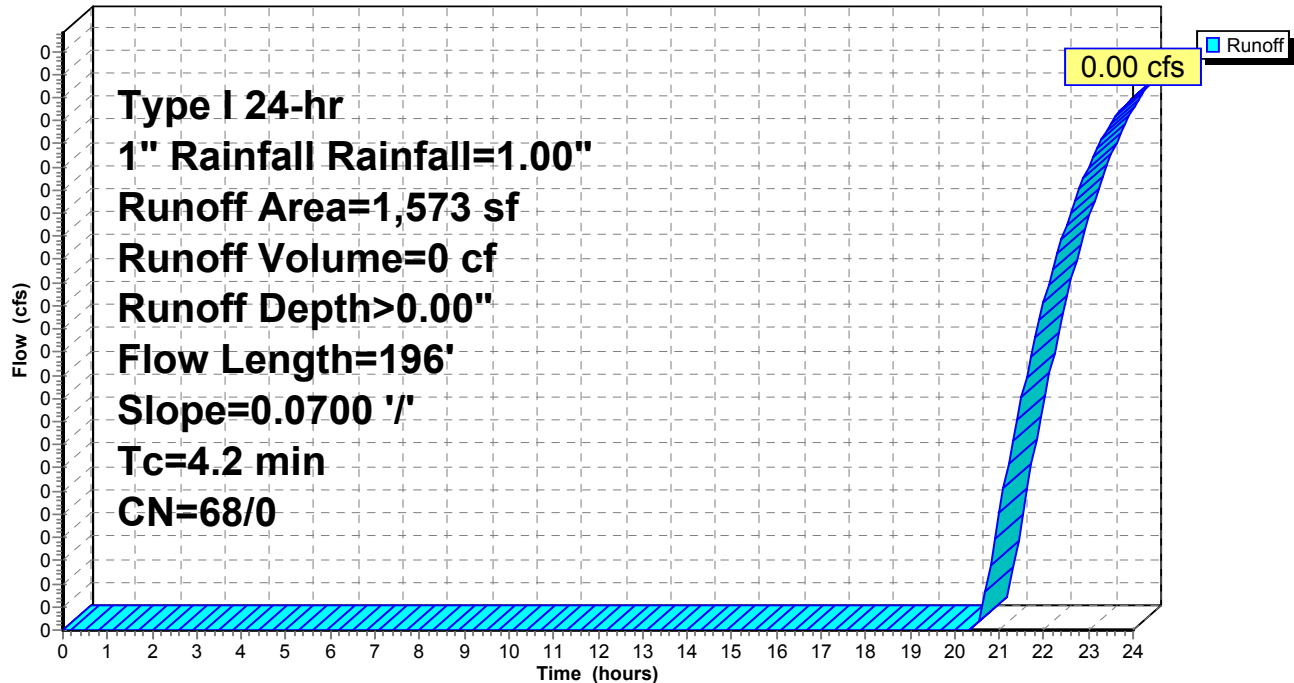
Type I 24-hr 1" Rainfall Rainfall=1.00"

Area (sf)	CN	Description
1,573	68	<50% Grass cover, Poor, HSG A
1,573	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	196	0.0700	0.77		Sheet Flow, Fallow n= 0.050 P2= 3.20"

Subcatchment SC-PRE B: East Driveway Sideyard

Hydrograph



Summary for Pond PRE WST: Theoretical Storage Tank

Inflow Area = 8,108 sf, 56.02% Impervious, Inflow Depth > 0.44" for 1" Rainfall event
 Inflow = 0.06 cfs @ 9.97 hrs, Volume= 299 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

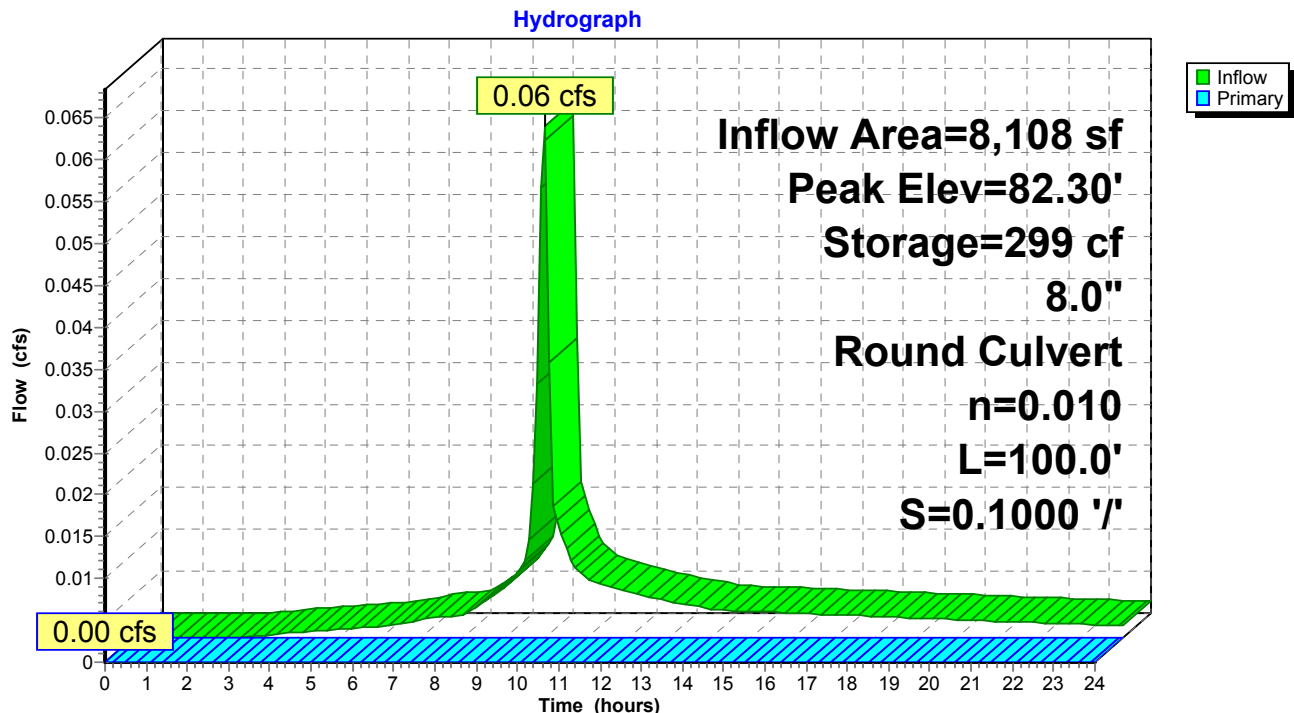
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 82.30' @ 24.00 hrs Surf.Area= 175 sf Storage= 299 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	80.00'	848 cf	72.0" Round Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	85.00'	8.0" Round Culvert L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 85.00' / 75.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=80.00' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond PRE WST: Theoretical Storage Tank

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-PRE 1: 1925/1927 Runoff Area=2,084 sf 100.00% Impervious Runoff Depth>6.47"
Flow Length=100' Slope=0.0300 '/' Tc=3.0 min CN=0/98 Runoff=0.21 cfs 1,123 cf

Subcatchment SC-PRE 2: Pre Landslide Runoff Area=2,088 sf 100.00% Impervious Runoff Depth>6.47"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.21 cfs 1,125 cf

Subcatchment SC-PRE 3: Yard Downslope of Runoff Area=1,858 sf 0.00% Impervious Runoff Depth>3.17"
Flow Length=45' Slope=0.4000 '/' Tc=3.0 min CN=68/0 Runoff=0.10 cfs 491 cf

Subcatchment SC-PRE 4: Drainages Either Runoff Area=740 sf 50.00% Impervious Runoff Depth>4.82"
Flow Length=1' Tc=3.0 min CN=68/98 Runoff=0.06 cfs 297 cf

Subcatchment SC-PRE 5: Lower Yard Runoff Area=1,338 sf 0.00% Impervious Runoff Depth>3.17"
Flow Length=25' Slope=0.1900 '/' Tc=3.0 min CN=68/0 Runoff=0.07 cfs 354 cf

Subcatchment SC-PRE 6: Lowermost Yard Runoff Area=6,760 sf 0.00% Impervious Runoff Depth>3.17"
Flow Length=145' Slope=0.1900 '/' Tc=3.0 min CN=68/0 Runoff=0.35 cfs 1,788 cf

Subcatchment SC-PRE 7: Coastal Bluff Runoff Area=2,868 sf 0.00% Impervious Runoff Depth>1.34"
Flow Length=35' Slope=1.0000 '/' Tc=3.0 min CN=48/0 Runoff=0.04 cfs 320 cf

Subcatchment SC-PRE 8: Beach Area Runoff Area=1,093 sf 20.04% Impervious Runoff Depth>5.09"
Flow Length=35' Slope=0.2100 '/' Tc=3.0 min CN=83/98 Runoff=0.09 cfs 464 cf

Subcatchment SC-PRE A: Upper Driveway Runoff Area=1,224 sf 100.00% Impervious Runoff Depth>6.47"
Flow Length=116' Slope=0.0300 '/' Tc=3.0 min CN=0/98 Runoff=0.12 cfs 660 cf

Subcatchment SC-PRE B: East Driveway Runoff Area=1,573 sf 0.00% Impervious Runoff Depth>3.17"
Flow Length=196' Slope=0.0700 '/' Tc=4.2 min CN=68/0 Runoff=0.08 cfs 416 cf

Pond PRE WST: Theoretical Storage Tank Peak Elev=85.49' Storage=813 cf Inflow=0.65 cfs 3,391 cf
8.0" Round Culvert n=0.010 L=100.0' S=0.1000 '/' Outflow=0.65 cfs 2,628 cf

Total Runoff Area = 21,626 sf Runoff Volume = 7,038 cf Average Runoff Depth = 3.91"
72.32% Pervious = 15,641 sf 27.68% Impervious = 5,985 sf

Summary for Subcatchment SC-PRE 1: 1925/1927 ECDLL Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

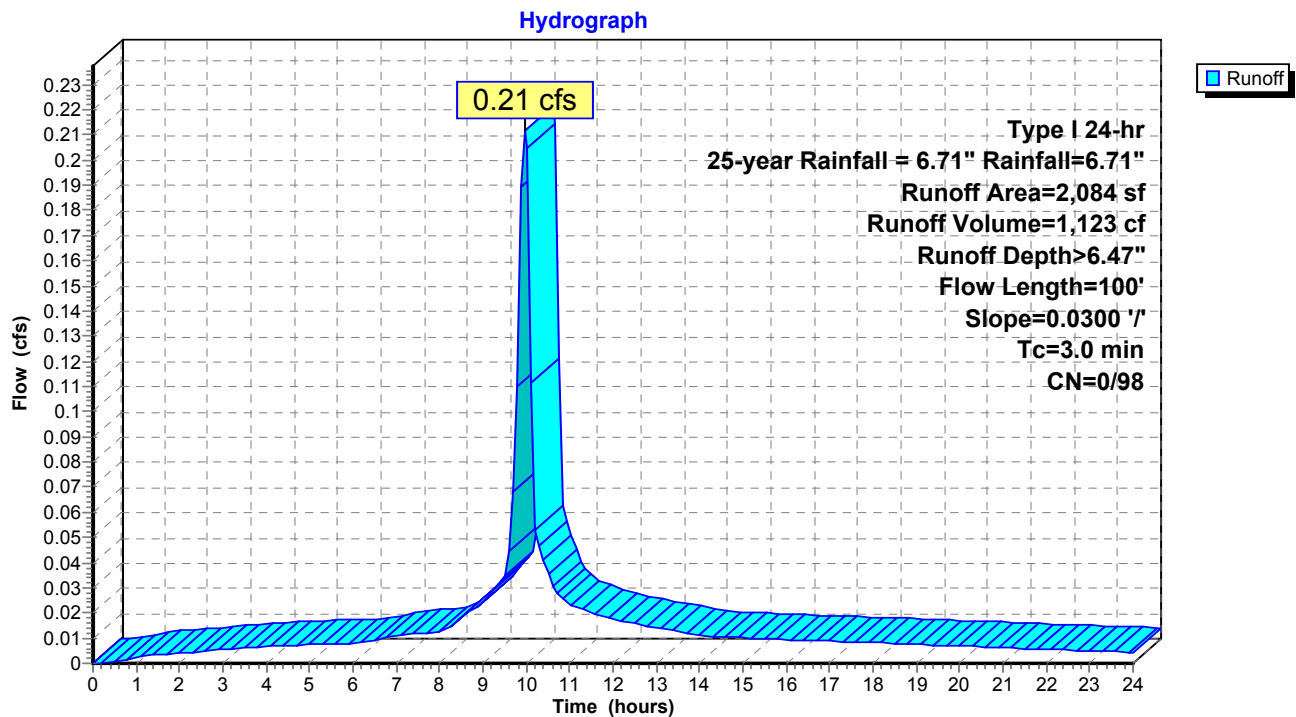
Runoff = 0.21 cfs @ 9.96 hrs, Volume= 1,123 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
2,084	98	Unconnected pavement, HSG A
2,084	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	100	0.0300	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.0	100	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 1: 1925/1927 ECDLL Driveway



Summary for Subcatchment SC-PRE 2: Pre Landslide Residence

[49] Hint: $T_c < 2dt$ may require smaller dt

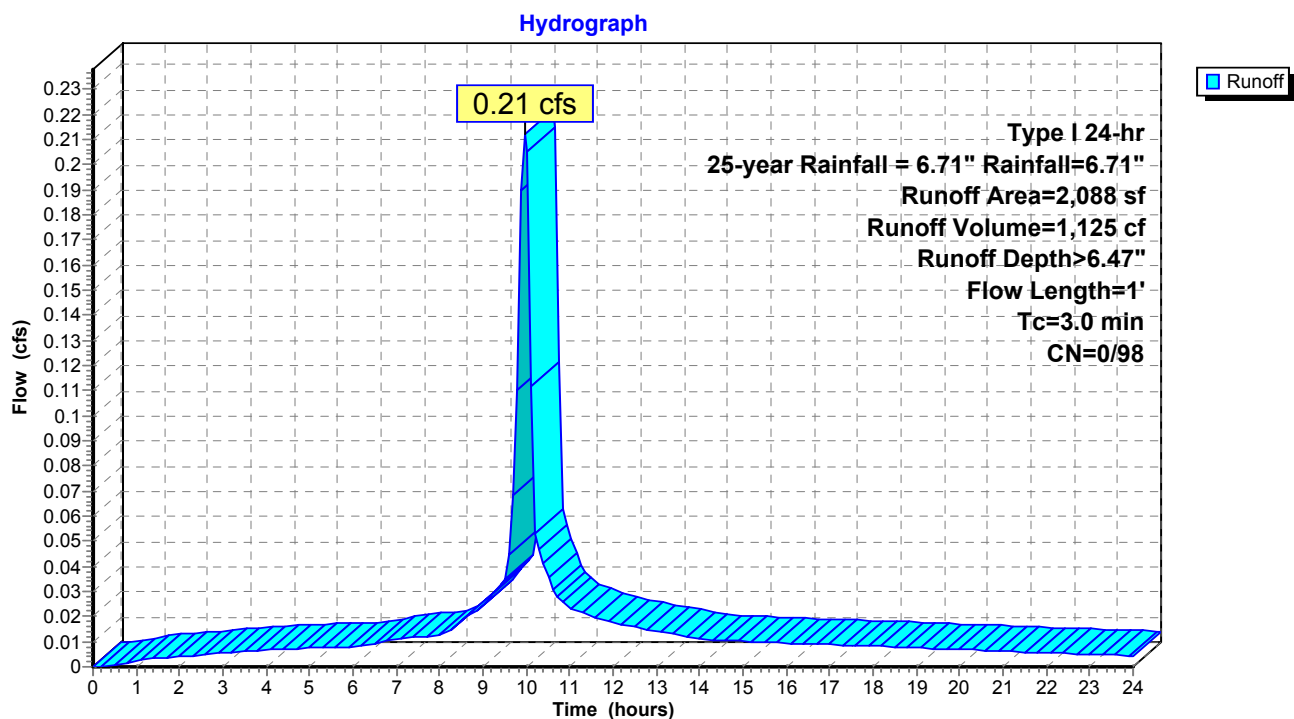
Runoff = 0.21 cfs @ 9.96 hrs, Volume= 1,125 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
2,088	98	Roofs, HSG A
2,088	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-PRE 2: Pre Landslide Residence



Summary for Subcatchment SC-PRE 3: Yard Downslope of Residence

[49] Hint: $T_c < 2dt$ may require smaller dt

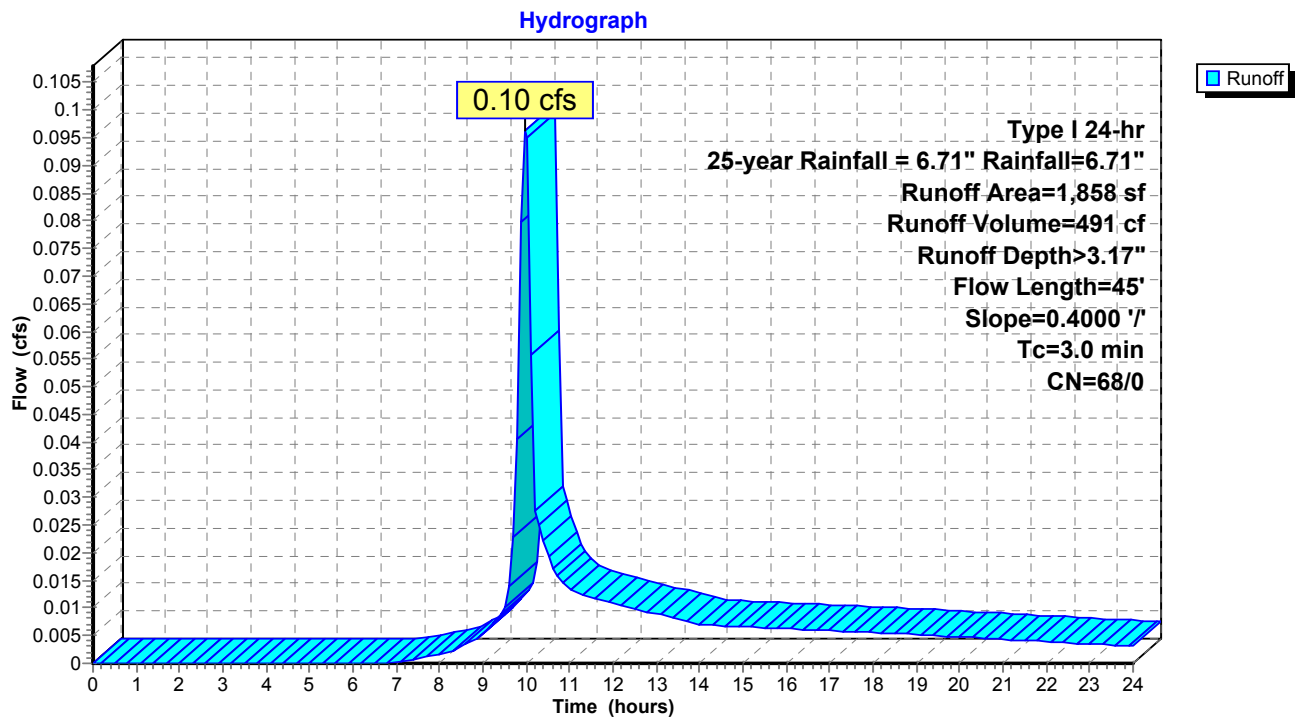
Runoff = 0.10 cfs @ 9.98 hrs, Volume= 491 cf, Depth> 3.17"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,858	68	<50% Grass cover, Poor, HSG A
1,858	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	45	0.4000	1.16		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.6	45	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 3: Yard Downslope of Residence



Summary for Subcatchment SC-PRE 4: Drainages Either Side of Residence

[49] Hint: $T_c < 2dt$ may require smaller dt

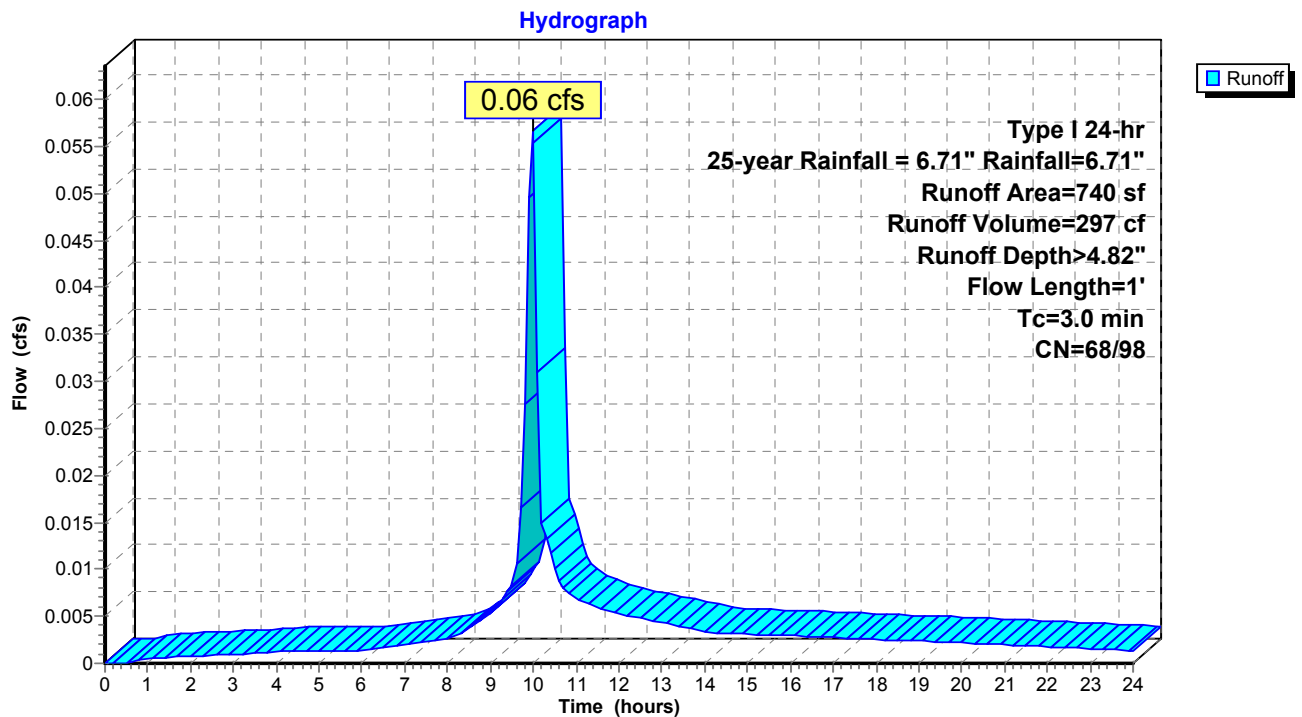
Runoff = 0.06 cfs @ 9.97 hrs, Volume= 297 cf, Depth> 4.82"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
740	83	Paved roads w/open ditches, 50% imp, HSG A
370	68	50.00% Pervious Area
370	98	50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1				Total, Increased to minimum $T_c = 3.0$ min

Subcatchment SC-PRE 4: Drainages Either Side of Residence



Summary for Subcatchment SC-PRE 5: Lower Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

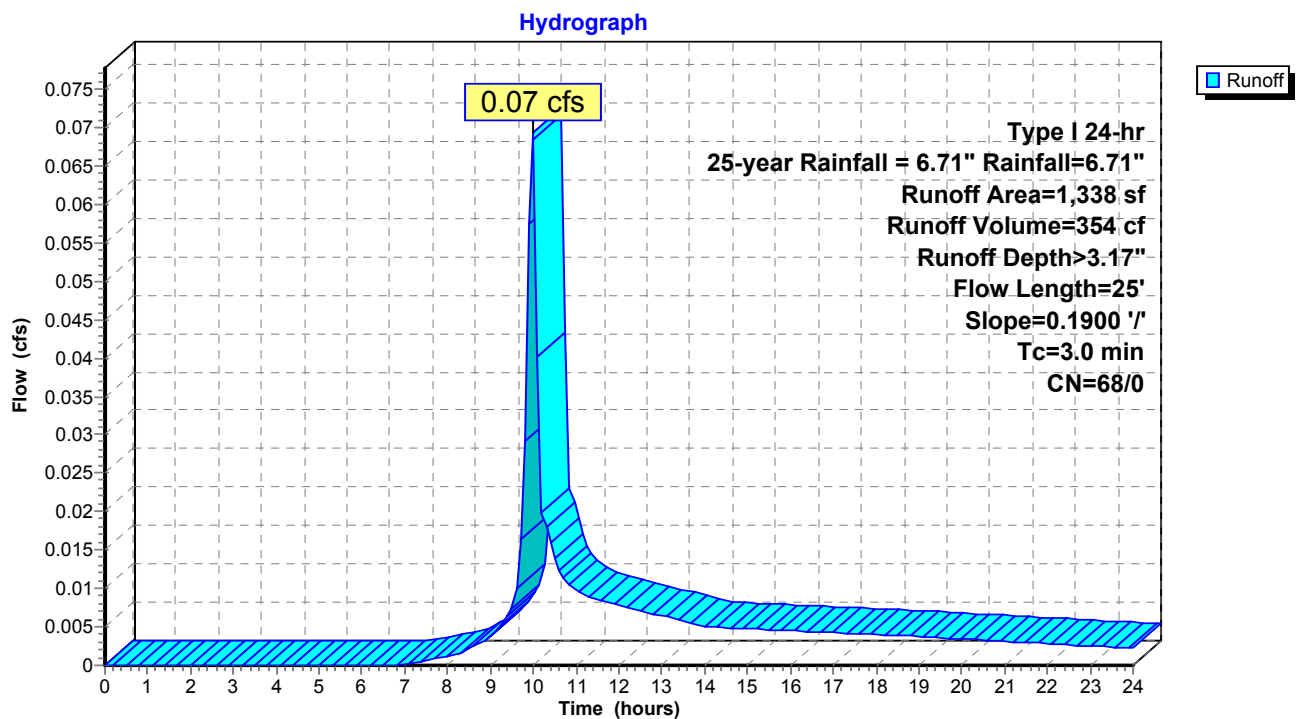
Runoff = 0.07 cfs @ 9.98 hrs, Volume= 354 cf, Depth> 3.17"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,338	68	<50% Grass cover, Poor, HSG A
1,338	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.1900	0.76		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 5: Lower Yard



Summary for Subcatchment SC-PRE 6: Lowermost Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

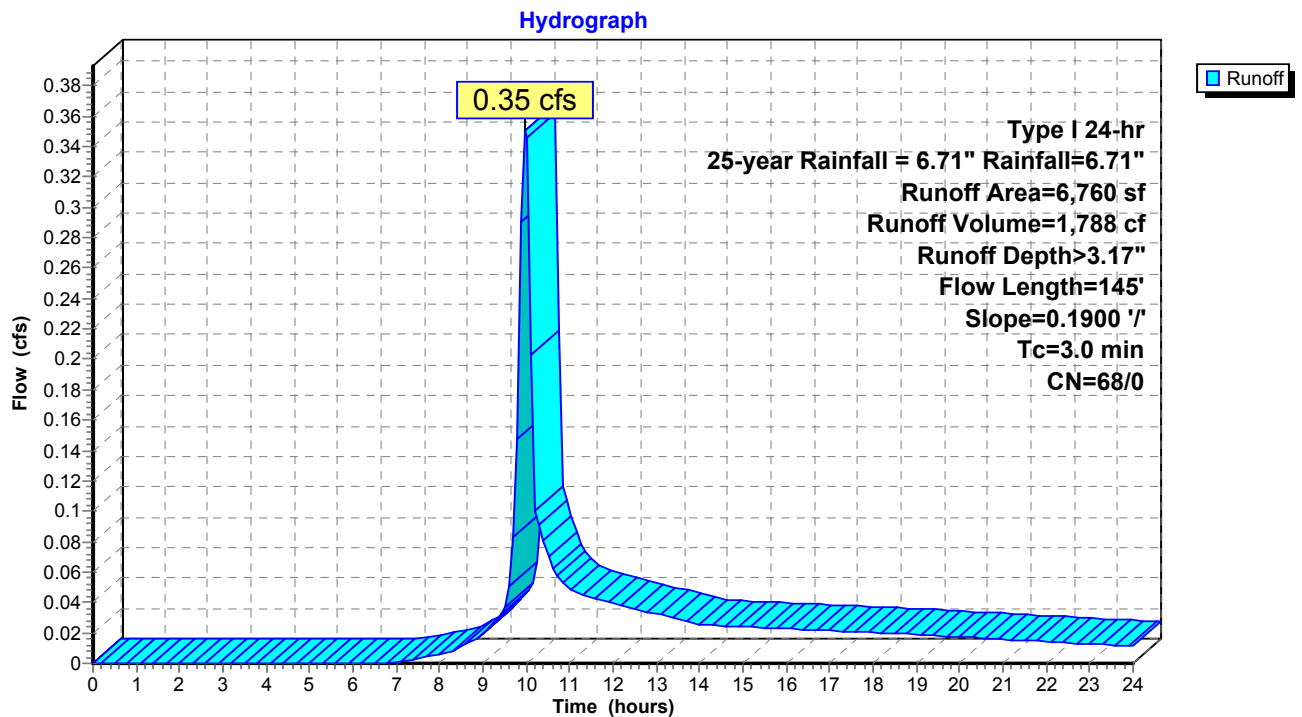
Runoff = 0.35 cfs @ 9.98 hrs, Volume= 1,788 cf, Depth> 3.17"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
6,760	68	<50% Grass cover, Poor, HSG A
6,760	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	145	0.1900	1.09		Sheet Flow, Fallow n= 0.050 P2= 3.20"
2.2	145	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 6: Lowermost Yard



Summary for Subcatchment SC-PRE 7: Coastal Bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

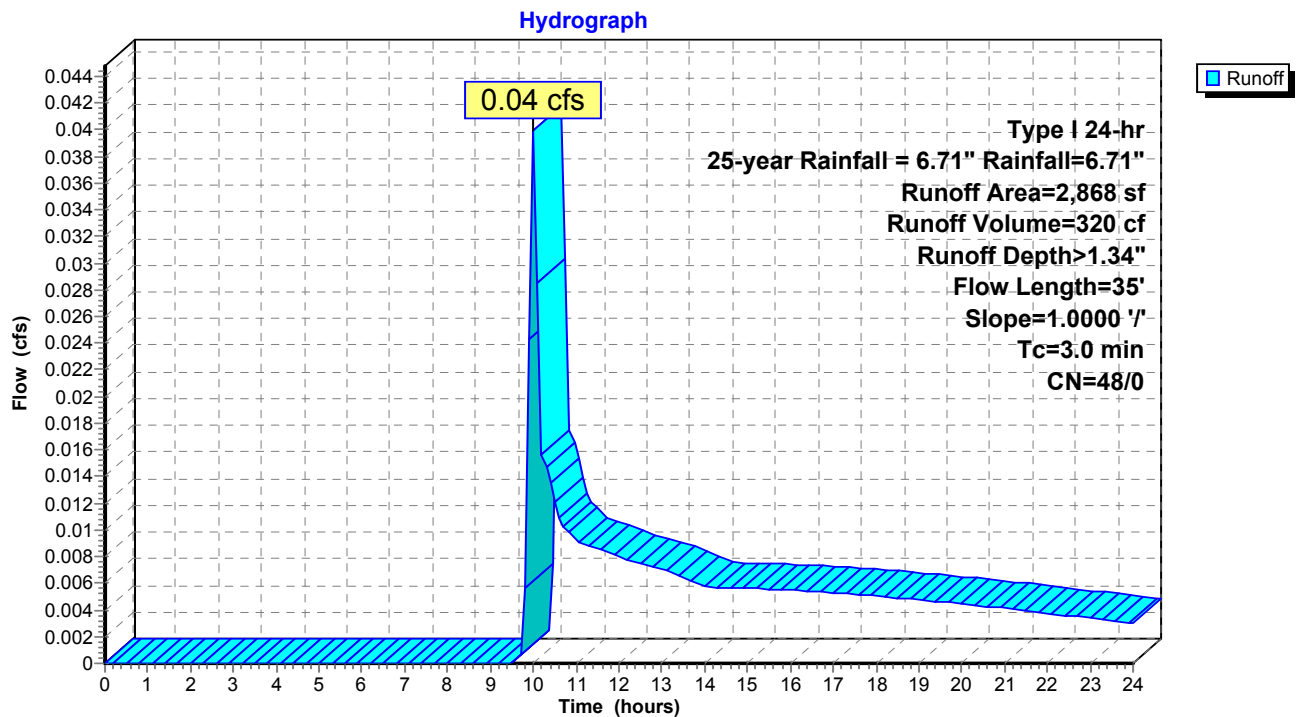
Runoff = 0.04 cfs @ 10.01 hrs, Volume= 320 cf, Depth> 1.34"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
2,868	48	Brush, Poor, HSG A
2,868	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE 7: Coastal Bluff



Summary for Subcatchment SC-PRE 8: Beach Area

[49] Hint: $T_c < 2dt$ may require smaller dt

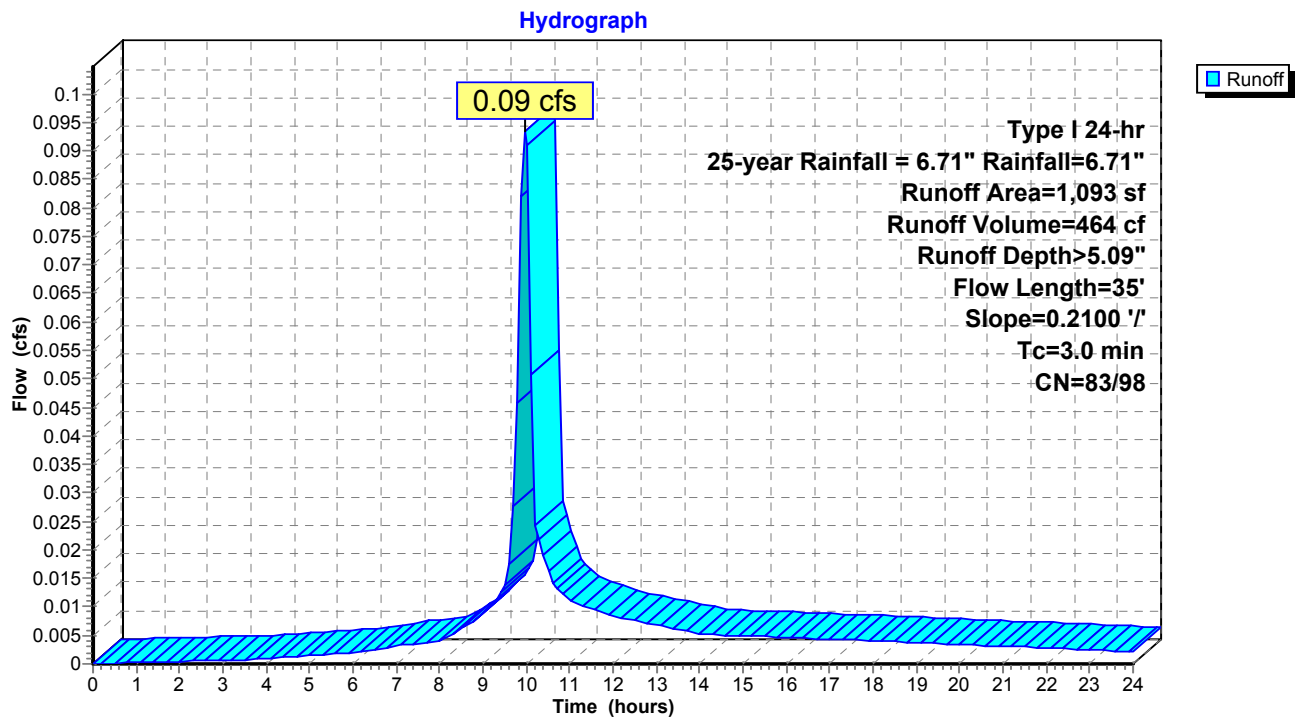
Runoff = 0.09 cfs @ 9.97 hrs, Volume= 464 cf, Depth> 5.09"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
874	83	Brush, Poor, HSG D
219	98	Unconnected pavement, HSG D
1,093	86	Weighted Average
874	83	79.96% Pervious Area
219	98	20.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.7	35	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-PRE 8: Beach Area



Summary for Subcatchment SC-PRE A: Upper Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

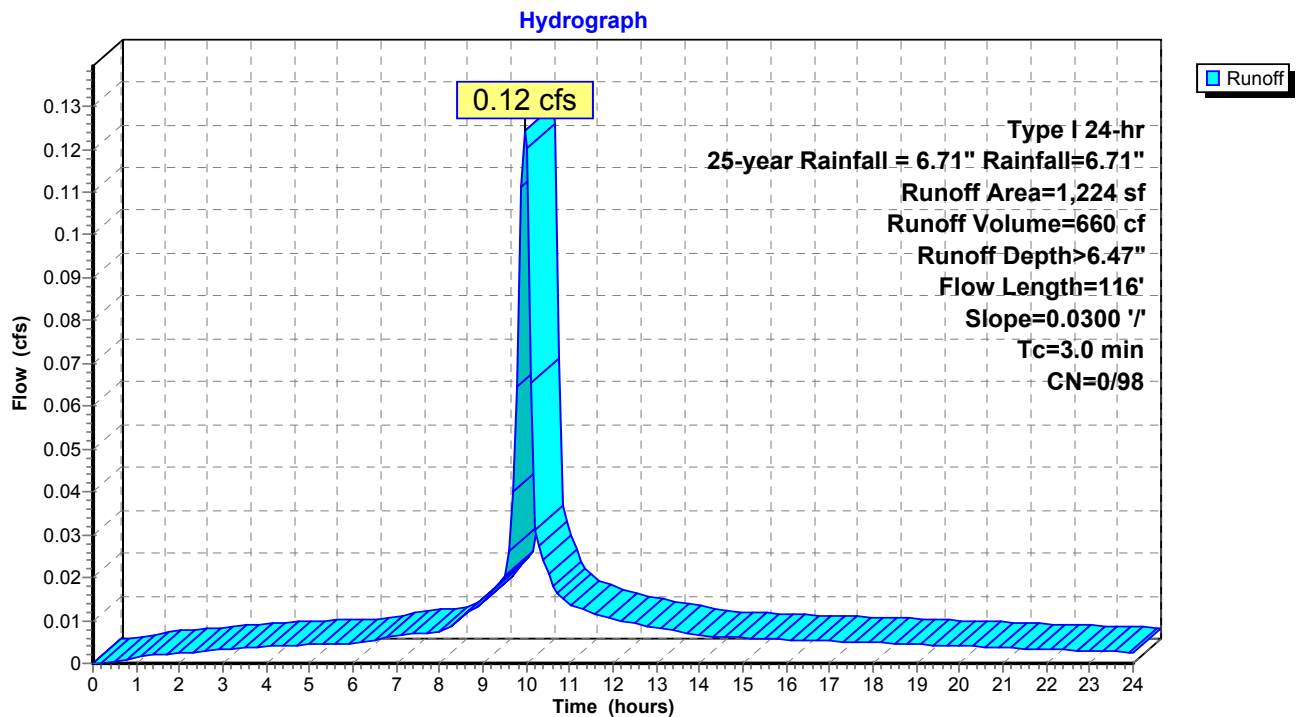
Runoff = 0.12 cfs @ 9.96 hrs, Volume= 660 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,224	98	Paved roads w/curbs & sewers, HSG A
1,224	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	116	0.0300	1.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
1.2	116	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-PRE A: Upper Driveway



Summary for Subcatchment SC-PRE B: East Driveway Sideyard

[49] Hint: $T_c < 2dt$ may require smaller dt

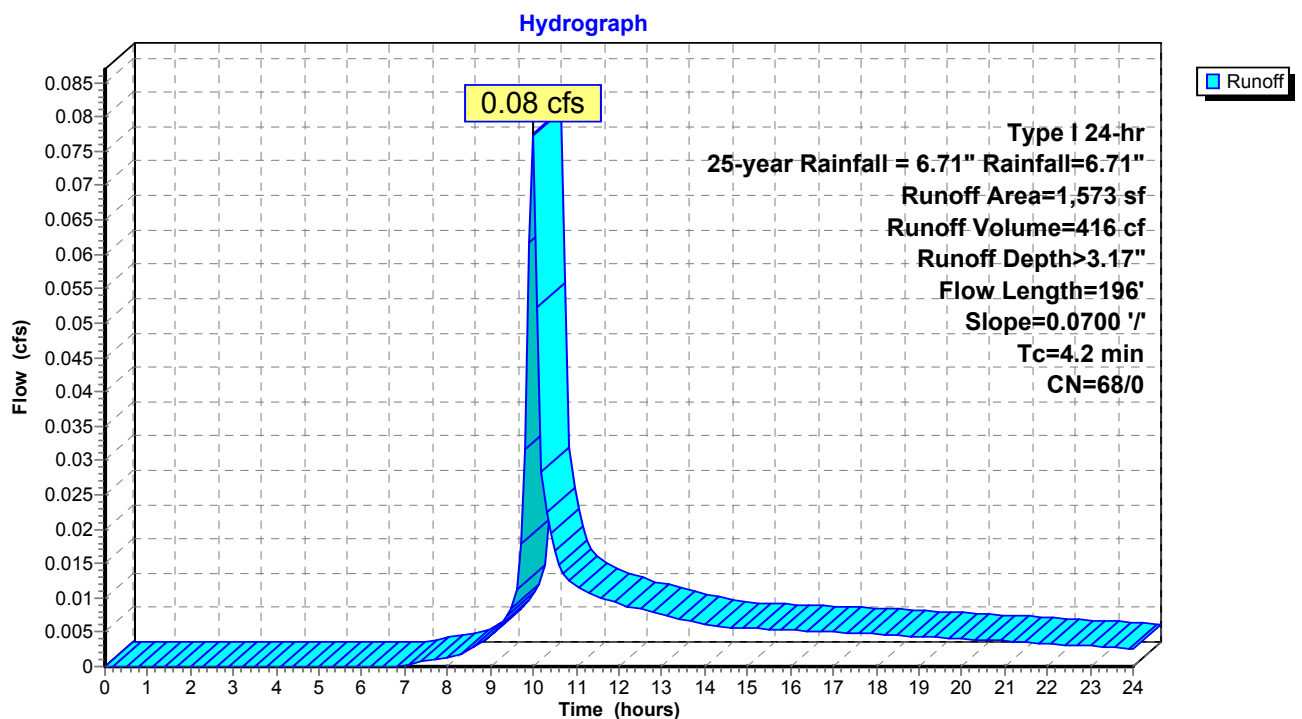
Runoff = 0.08 cfs @ 9.99 hrs, Volume= 416 cf, Depth> 3.17"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,573	68	<50% Grass cover, Poor, HSG A
1,573	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	196	0.0700	0.77		Sheet Flow, Fallow n= 0.050 P2= 3.20"

Subcatchment SC-PRE B: East Driveway Sideyard



Summary for Pond PRE WST: Theoretical Storage Tank

[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 8,108 sf, 56.02% Impervious, Inflow Depth > 5.02" for 25-year Rainfall = 6.71" event
 Inflow = 0.65 cfs @ 9.97 hrs, Volume= 3,391 cf
 Outflow = 0.65 cfs @ 9.99 hrs, Volume= 2,628 cf, Atten= 0%, Lag= 1.0 min
 Primary = 0.65 cfs @ 9.99 hrs, Volume= 2,628 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 85.49' @ 9.98 hrs Surf.Area= 101 sf Storage= 813 cf

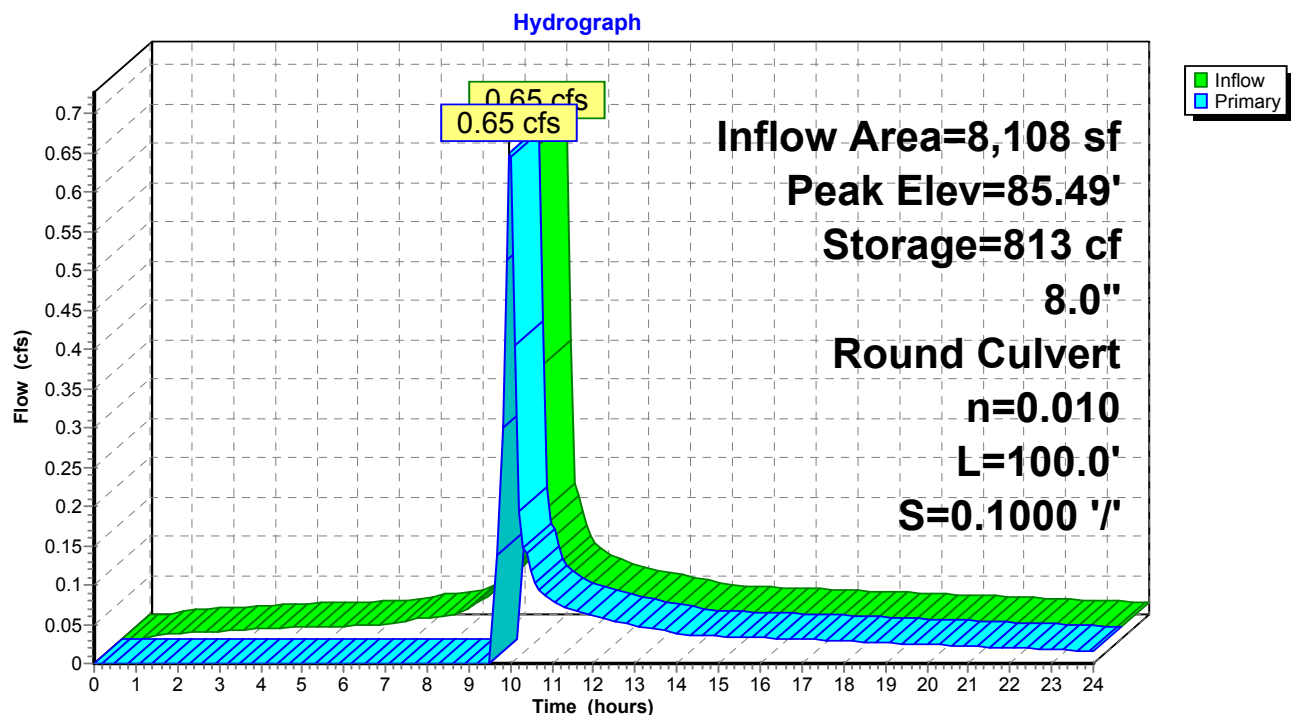
Plug-Flow detention time= 212.5 min calculated for 2,617 cf (77% of inflow)
 Center-of-Mass det. time= 90.9 min (815.6 - 724.7)

Volume	Invert	Avail.Storage	Storage Description
#1	80.00'	848 cf	72.0" Round Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	85.00'	8.0" Round Culvert L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 85.00' / 75.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

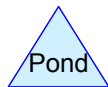
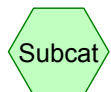
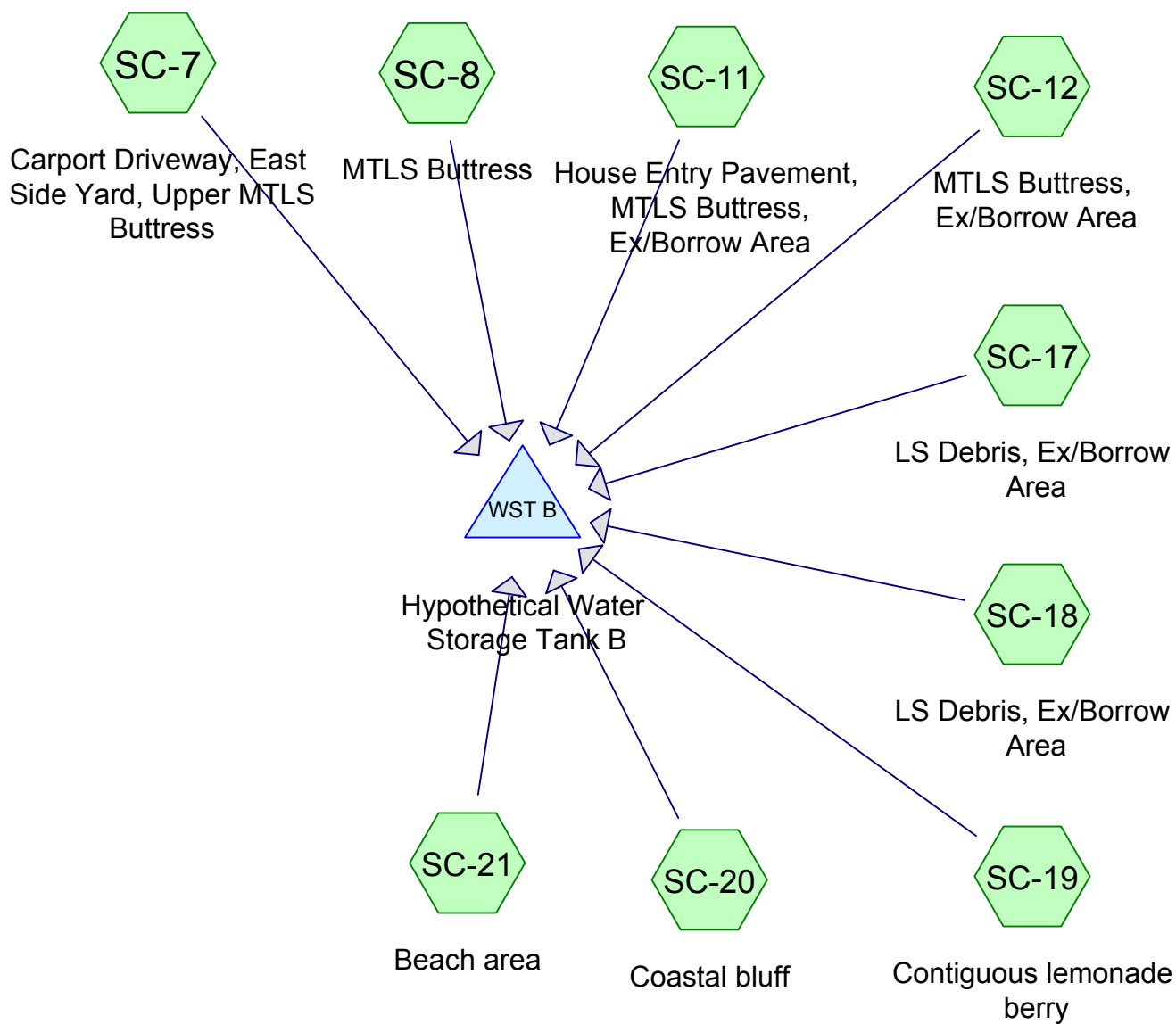
Primary OutFlow Max=0.63 cfs @ 9.99 hrs HW=85.48' (Free Discharge)
 1=Culvert (Inlet Controls 0.63 cfs @ 2.35 fps)

Pond PRE WST: Theoretical Storage Tank



APPENDIX F

HydroCAD Quantitative Analysis for Current Developed Conditions (Upper and Lower), 2-Year/5-Year/10-Year/25-Year, 24-Hour Rainfall Events at 1925 ECDLL, Santa Barbara



1925 ECDLL_Current Conditions Analysis_Upper_2015-06-25

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Printed 6/25/2015

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
4,065	68	<50% Grass cover, Poor, HSG A (SC-11, SC-12, SC-17, SC-18, SC-7, SC-8)
6,361	35	Brush, Fair, HSG A (SC-19)
1,658	48	Brush, Poor, HSG A (SC-20)
1,694	83	Brush, Poor, HSG D (SC-21)
320	98	Impervious (SC-7)
160	98	Unconnected pavement, HSG A (SC-11)
416	98	Unconnected pavement, HSG D (SC-21)
14,674	55	TOTAL AREA

1925 ECDLL_Current Conditions Analysis_Upper_2015-06-25

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
12,244	HSG A	SC-11, SC-12, SC-17, SC-18, SC-19, SC-20, SC-7, SC-8
0	HSG B	
0	HSG C	
2,110	HSG D	SC-21
320	Other	SC-7
14,674		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subo Num
4,065	0	0	0	0	4,065	<50% Grass cover, Poor	
6,361	0	0	0	0	6,361	Brush, Fair	
1,658	0	0	1,694	0	3,352	Brush, Poor	
0	0	0	0	320	320	Impervious	
160	0	0	416	0	576	Unconnected pavement	
12,244	0	0	2,110	320	14,674	TOTAL AREA	

1925 ECDLL_Current Conditions Analysis_Upper_2015-06-Type I 24-hr 1" Rainfall=1.00"

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: House Entry Pavement, Runoff Area=465 sf 34.41% Impervious Runoff Depth>0.27"
Flow Length=78' Slope=0.4300 '/' Tc=3.0 min CN=68/98 Runoff=0.00 cfs 11 cf

Subcatchment SC-12: MTLs Buttress, Runoff Area=363 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=65' Slope=0.3600 '/' Tc=3.0 min CN=68/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-17: LS Debris, Ex/Borrow Runoff Area=1,516 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=50' Slope=0.2400 '/' Tc=3.0 min CN=68/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-18: LS Debris, Ex/Borrow Runoff Area=590 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=25' Slope=0.2400 '/' Tc=3.0 min CN=68/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=130' Slope=0.2300 '/' Tc=3.0 min CN=35/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=35' Slope=1.0000 '/' Tc=3.0 min CN=48/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>0.26"
Flow Length=35' Slope=0.2100 '/' Tc=3.0 min CN=83/98 Runoff=0.01 cfs 46 cf

Subcatchment SC-7: Carport Driveway, East Runoff Area=653 sf 49.00% Impervious Runoff Depth>0.39"
Flow Length=40' Slope=0.1600 '/' Tc=3.0 min CN=68/98 Runoff=0.00 cfs 21 cf

Subcatchment SC-8: MTLs Buttress Runoff Area=958 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=30' Slope=0.0800 '/' Tc=3.0 min CN=68/0 Runoff=0.00 cfs 0 cf

Pond WST B: Hypothetical Water Storage Tank B

Inflow=0.01 cfs 78 cf

Primary=0.01 cfs 78 cf

Total Runoff Area = 14,674 sf Runoff Volume = 78 cf Average Runoff Depth = 0.06"
93.89% Pervious = 13,778 sf 6.11% Impervious = 896 sf

Summary for Subcatchment SC-11: House Entry Pavement, MTL5 Buttress, Ex/Borrow Area

[49] Hint: Tc<2dt may require smaller dt

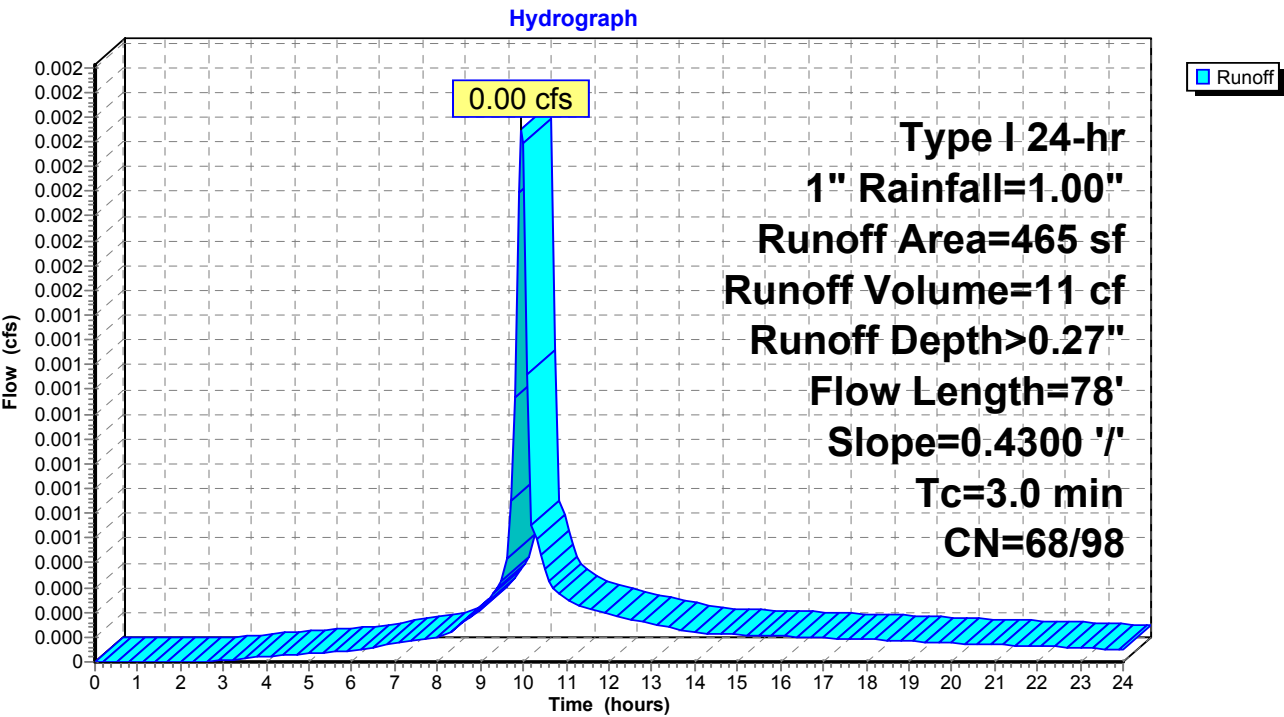
Runoff = 0.00 cfs @ 9.97 hrs, Volume= 11 cf, Depth> 0.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
305	68	<50% Grass cover, Poor, HSG A
160	98	Unconnected pavement, HSG A
465	78	Weighted Average
305	68	65.59% Pervious Area
160	98	34.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-11: House Entry Pavement, MTL5 Buttress, Ex/Borrow Area



Summary for Subcatchment SC-12: MTL5 Buttress, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt
 [73] Warning: Peak may fall outside time span

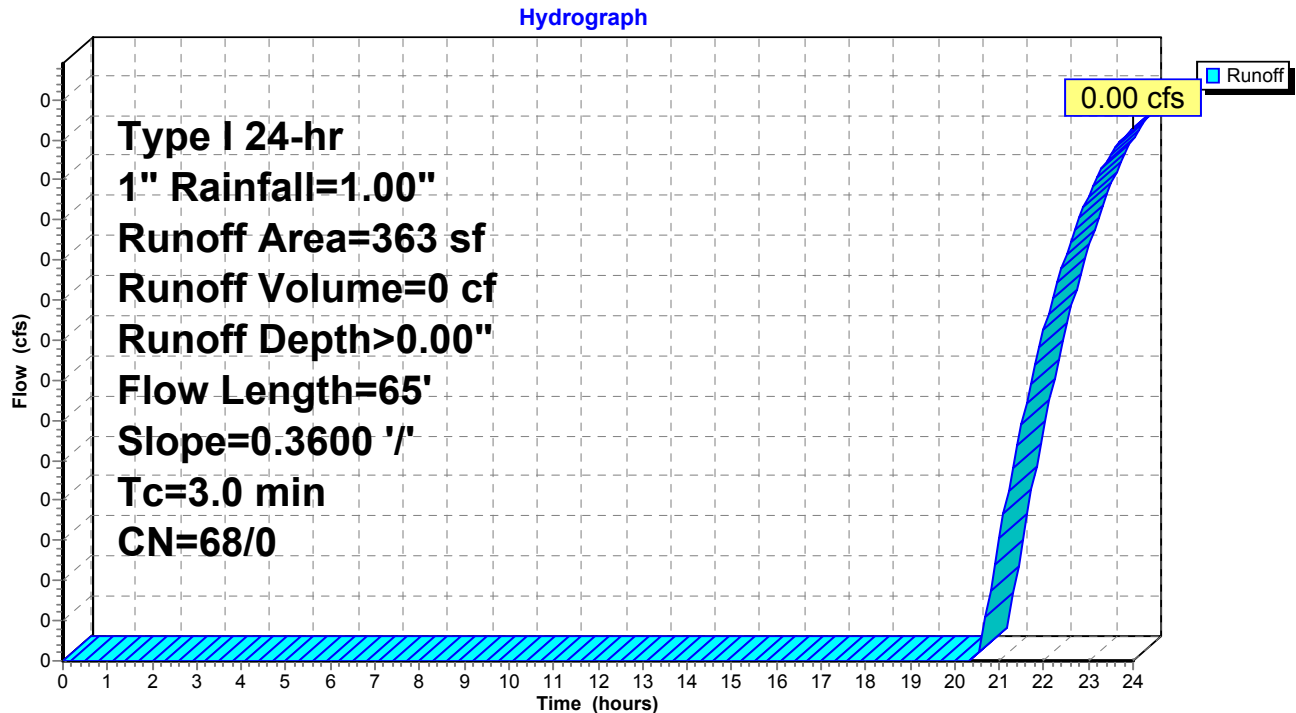
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
363	68	<50% Grass cover, Poor, HSG A
363	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	65	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-12: MTL5 Buttress, Ex/Borrow Area



Summary for Subcatchment SC-17: LS Debris, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt
 [73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"

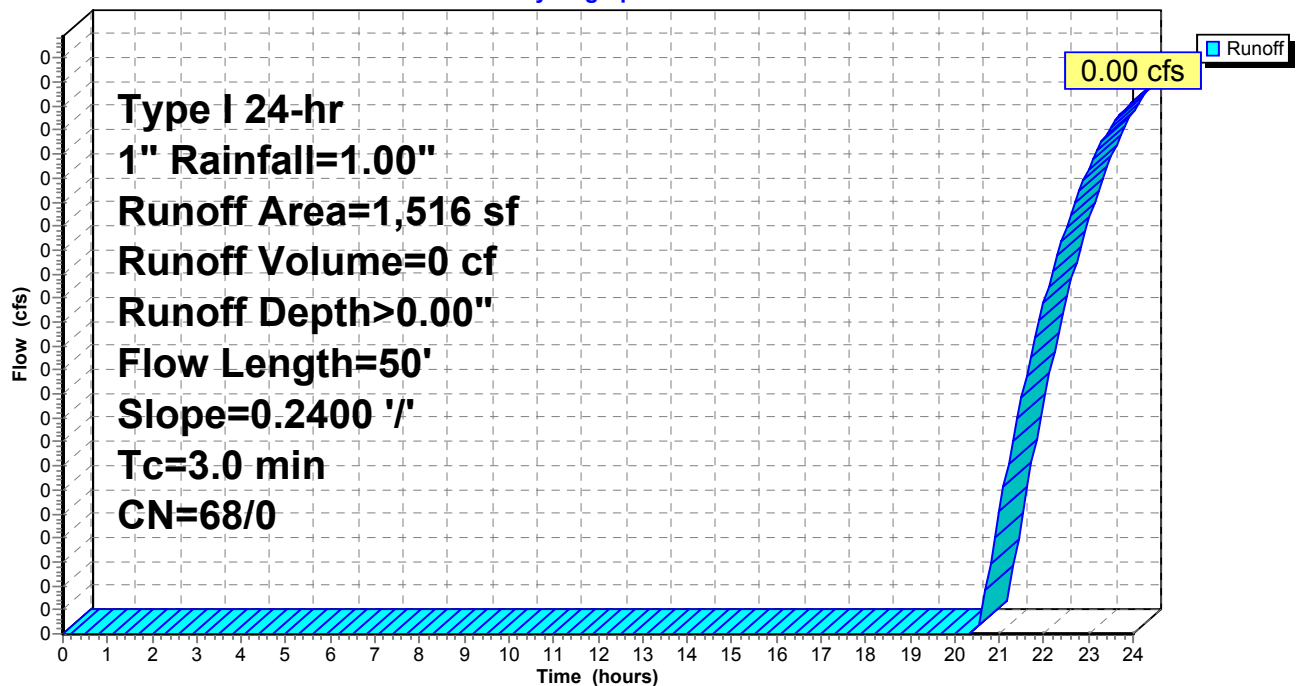
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
1,516	68	<50% Grass cover, Poor, HSG A
1,516	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.9	50	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-17: LS Debris, Ex/Borrow Area

Hydrograph



Summary for Subcatchment SC-18: LS Debris, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt
 [73] Warning: Peak may fall outside time span

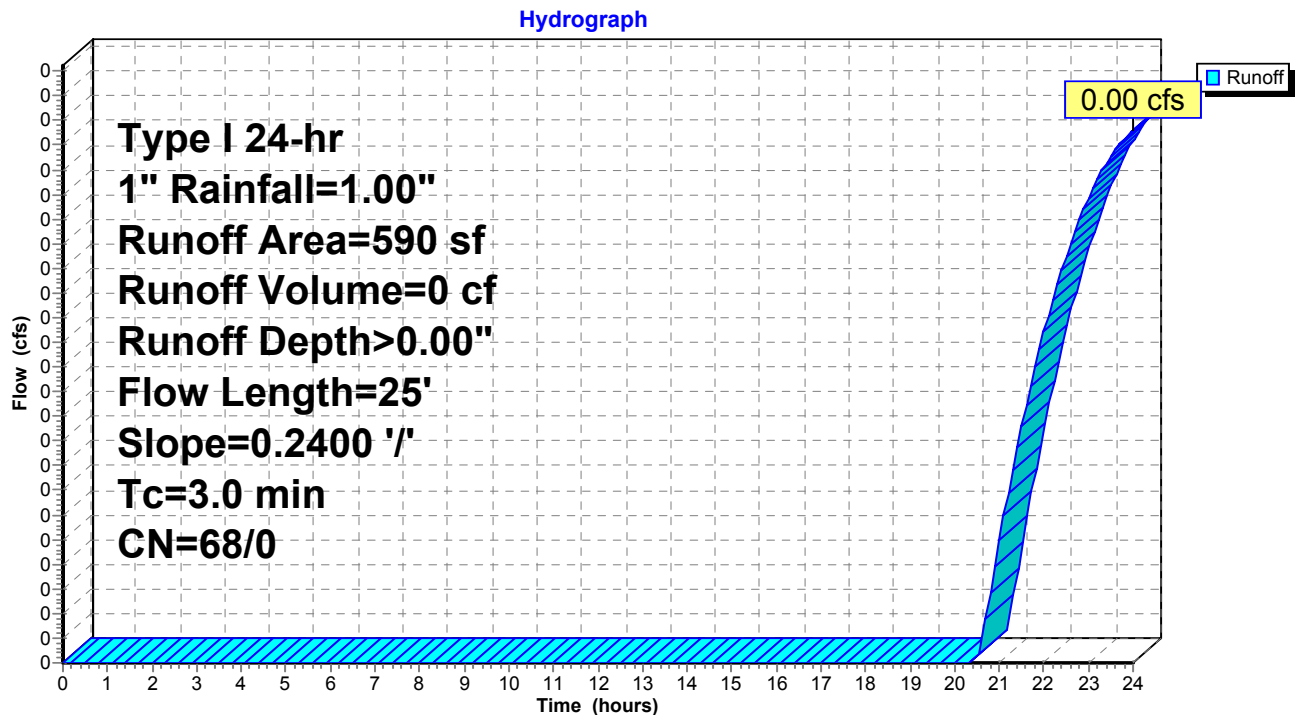
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
590	68	<50% Grass cover, Poor, HSG A
590	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-18: LS Debris, Ex/Borrow Area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

[45] Hint: Runoff=Zero

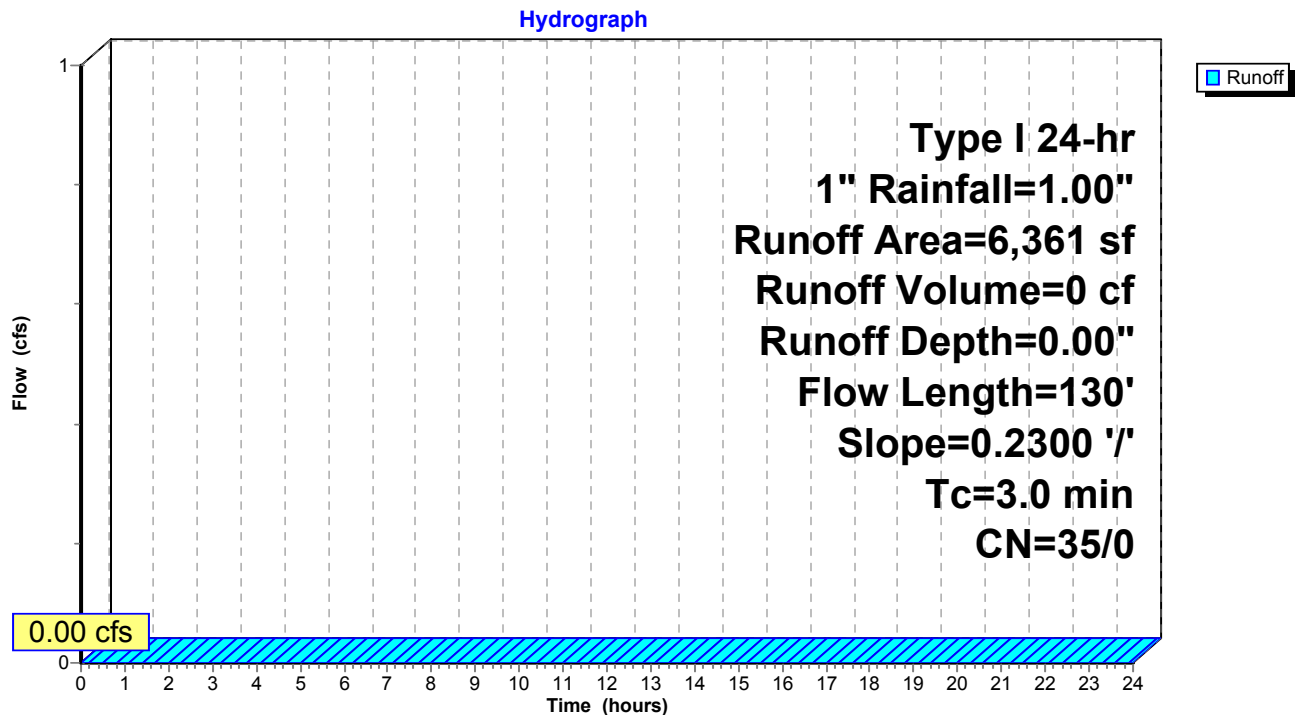
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

[45] Hint: Runoff=Zero

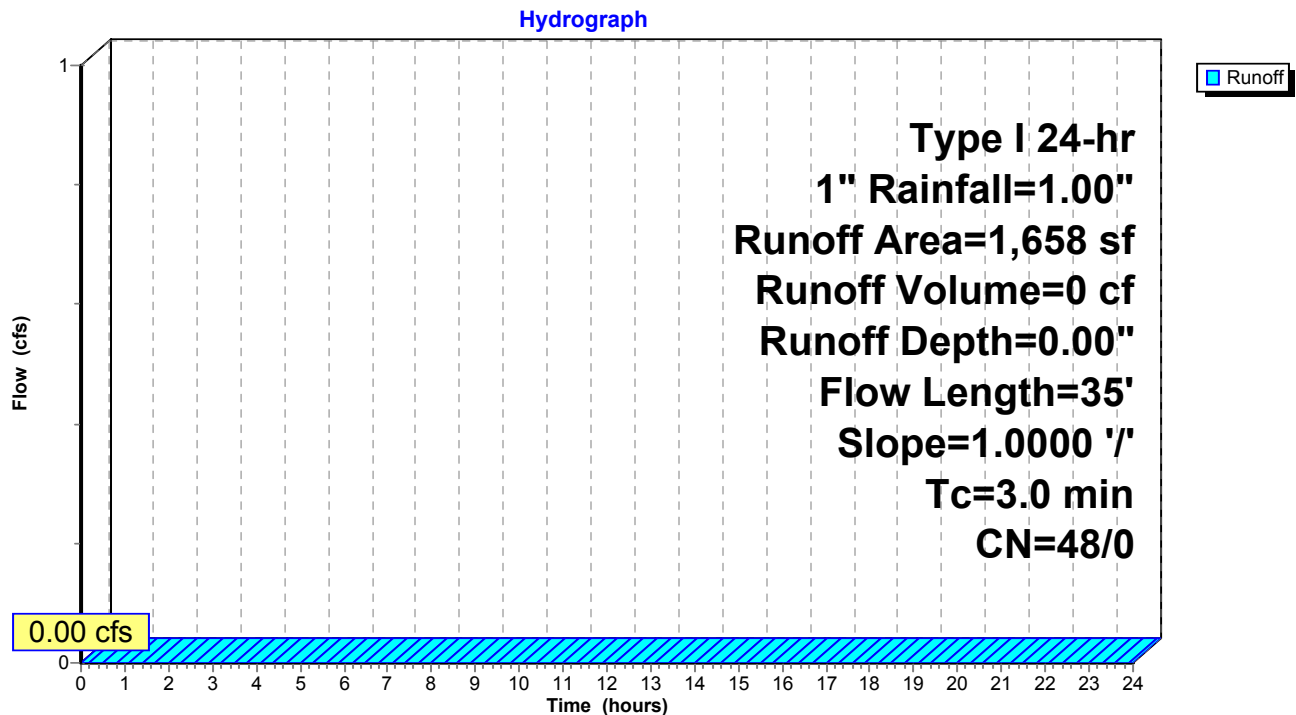
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

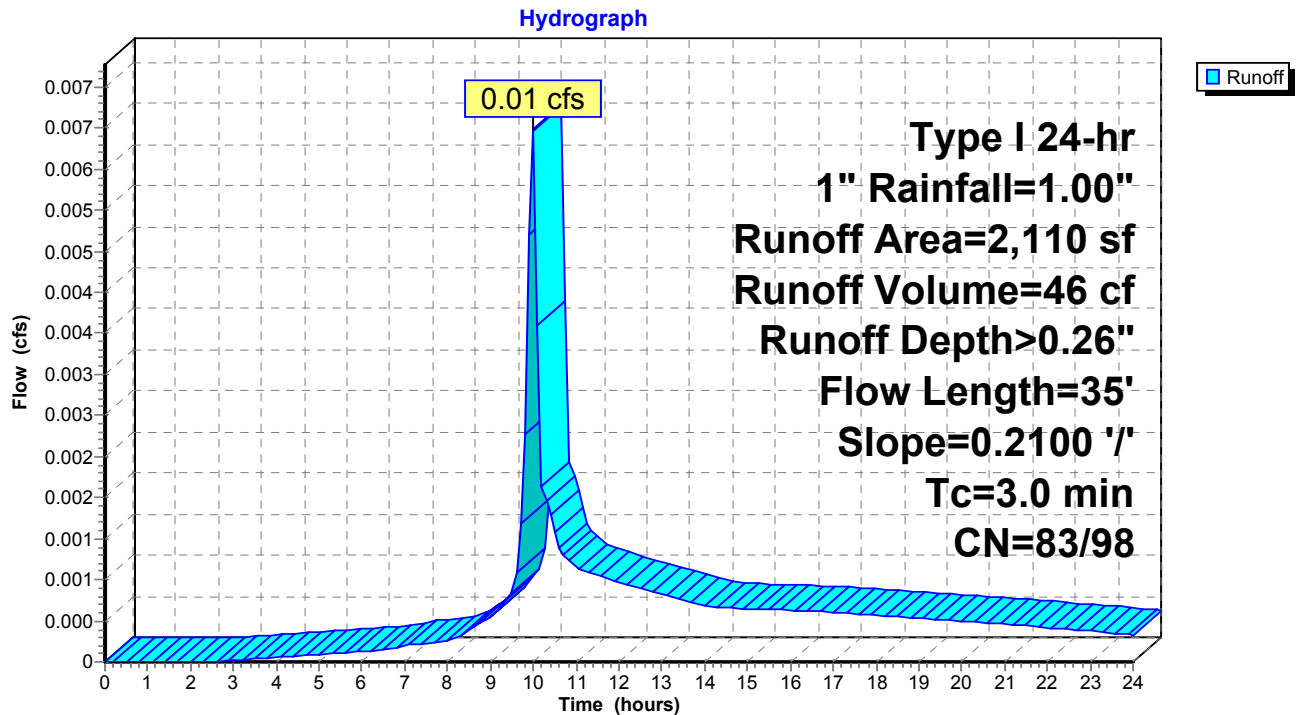
Runoff = 0.01 cfs @ 9.98 hrs, Volume= 46 cf, Depth> 0.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.7	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-21: Beach area



Summary for Subcatchment SC-7: Carport Driveway, East Side Yard, Upper MTLS Buttress

[49] Hint: $T_c < 2dt$ may require smaller dt

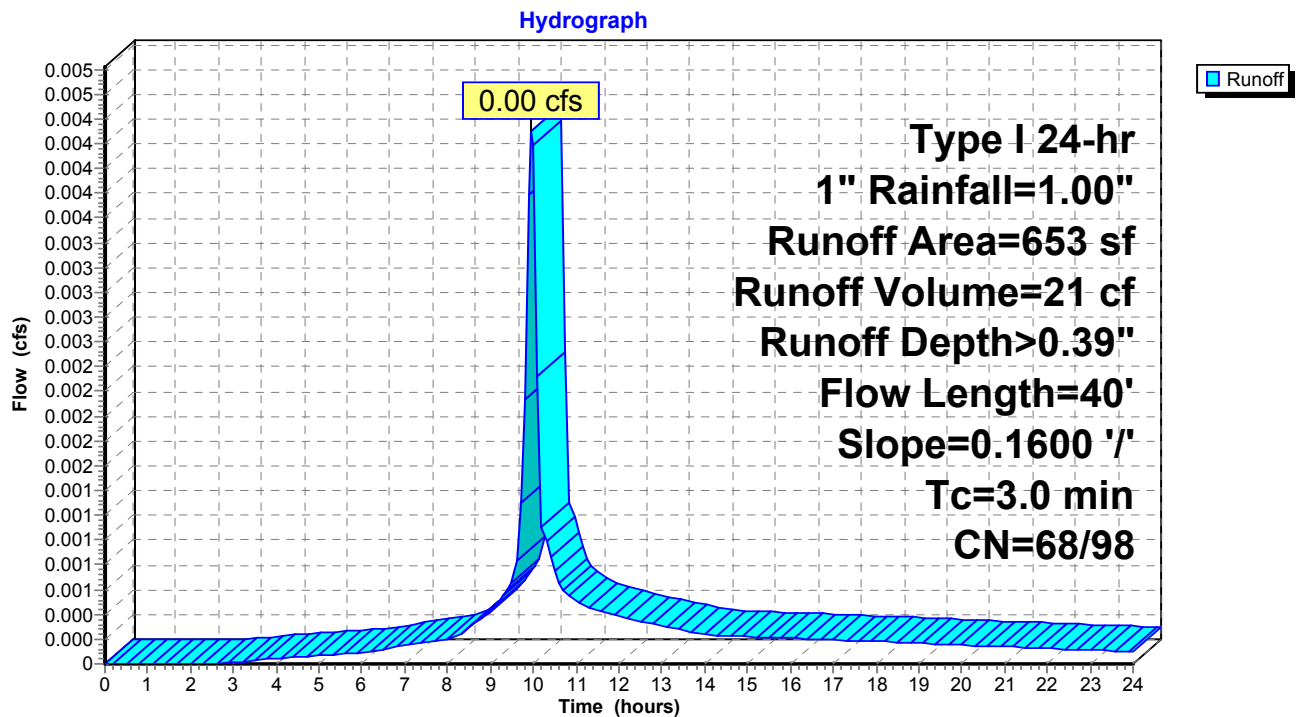
Runoff = 0.00 cfs @ 9.97 hrs, Volume= 21 cf, Depth> 0.39"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

	Area (sf)	CN	Description
*	320	98	Impervious
	333	68	<50% Grass cover, Poor, HSG A
	653	83	Weighted Average
	333	68	51.00% Pervious Area
	320	98	49.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	40	0.1600	2.05		Sheet Flow, $n= 0.015$ $P2= 3.20"$
0.3	40	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-7: Carport Driveway, East Side Yard, Upper MTLS Buttress



Summary for Subcatchment SC-8: MTL5 Buttress

[49] Hint: $T_c < 2dt$ may require smaller dt
 [73] Warning: Peak may fall outside time span

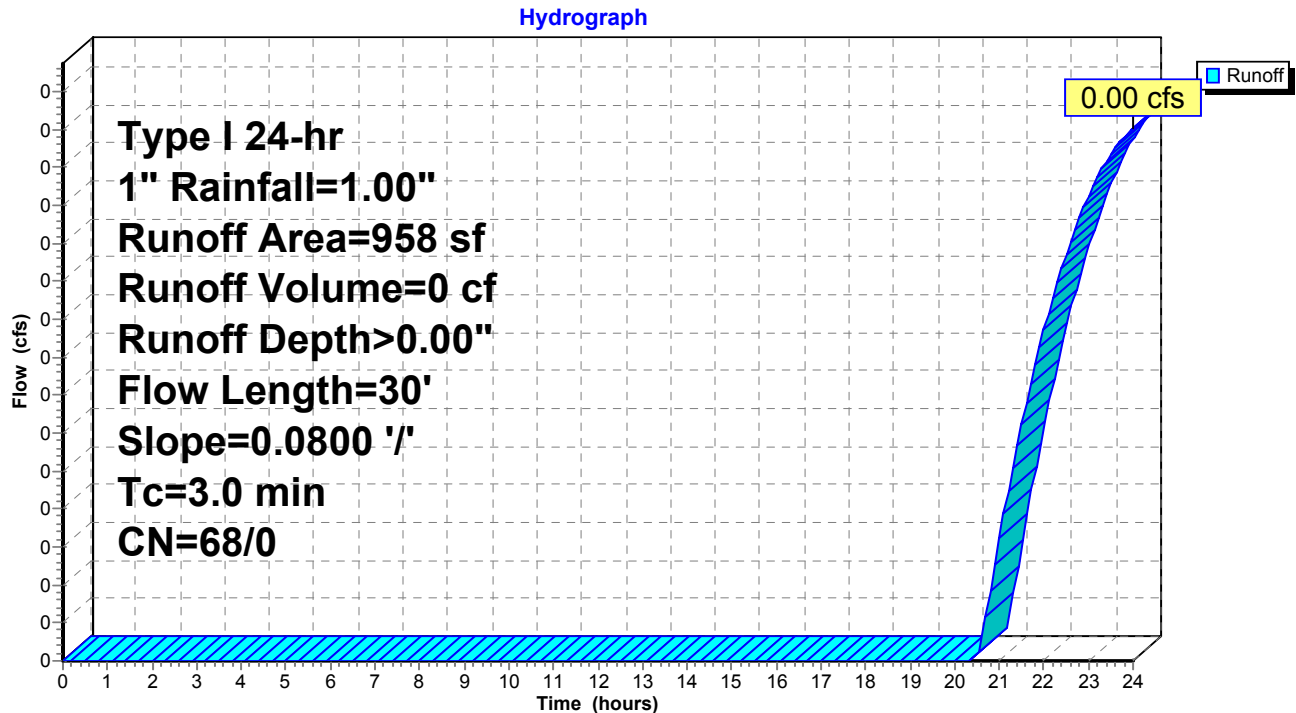
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
958	68	<50% Grass cover, Poor, HSG A
958	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0800	1.47		Sheet Flow, n= 0.015 P2= 3.20"
0.3	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-8: MTL5 Buttress



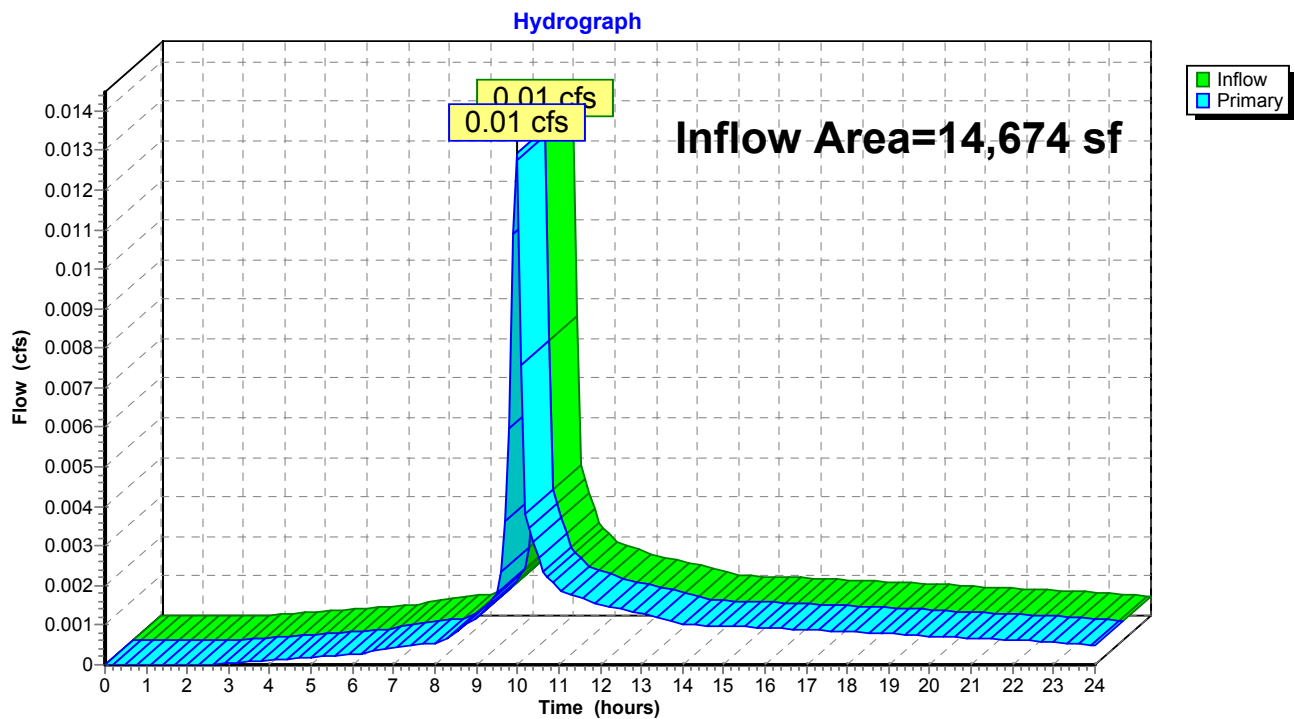
Summary for Pond WST B: Hypothetical Water Storage Tank B

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 14,674 sf, 6.11% Impervious, Inflow Depth > 0.06" for 1" event
Inflow = 0.01 cfs @ 9.98 hrs, Volume= 78 cf
Primary = 0.01 cfs @ 9.98 hrs, Volume= 78 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Pond WST B: Hypothetical Water Storage Tank B



1925 ECDLL_Current Conditions Analysis Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: House Entry Pavement, Runoff Area=465 sf 34.41% Impervious Runoff Depth>1.50"
Flow Length=78' Slope=0.4300 '/' Tc=3.0 min CN=68/98 Runoff=0.01 cfs 58 cf

Subcatchment SC-12: MTLs Buttress, Runoff Area=363 sf 0.00% Impervious Runoff Depth>0.73"
Flow Length=65' Slope=0.3600 '/' Tc=3.0 min CN=68/0 Runoff=0.00 cfs 22 cf

Subcatchment SC-17: LS Debris, Ex/Borrow Runoff Area=1,516 sf 0.00% Impervious Runoff Depth>0.73"
Flow Length=50' Slope=0.2400 '/' Tc=3.0 min CN=68/0 Runoff=0.01 cfs 92 cf

Subcatchment SC-18: LS Debris, Ex/Borrow Runoff Area=590 sf 0.00% Impervious Runoff Depth>0.73"
Flow Length=25' Slope=0.2400 '/' Tc=3.0 min CN=68/0 Runoff=0.01 cfs 36 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=130' Slope=0.2300 '/' Tc=3.0 min CN=35/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.09"
Flow Length=35' Slope=1.0000 '/' Tc=3.0 min CN=48/0 Runoff=0.00 cfs 12 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>1.88"
Flow Length=35' Slope=0.2100 '/' Tc=3.0 min CN=83/98 Runoff=0.06 cfs 330 cf

Subcatchment SC-7: Carport Driveway, East Runoff Area=653 sf 49.00% Impervious Runoff Depth>1.83"
Flow Length=40' Slope=0.1600 '/' Tc=3.0 min CN=68/98 Runoff=0.02 cfs 99 cf

Subcatchment SC-8: MTLs Buttress Runoff Area=958 sf 0.00% Impervious Runoff Depth>0.73"
Flow Length=30' Slope=0.0800 '/' Tc=3.0 min CN=68/0 Runoff=0.01 cfs 58 cf

Pond WST B: Hypothetical Water Storage Tank B

Inflow=0.12 cfs 709 cf

Primary=0.12 cfs 709 cf

Total Runoff Area = 14,674 sf Runoff Volume = 709 cf Average Runoff Depth = 0.58"
93.89% Pervious = 13,778 sf 6.11% Impervious = 896 sf

Summary for Subcatchment SC-11: House Entry Pavement, MTL5 Buttress, Ex/Borrow Area

[49] Hint: Tc<2dt may require smaller dt

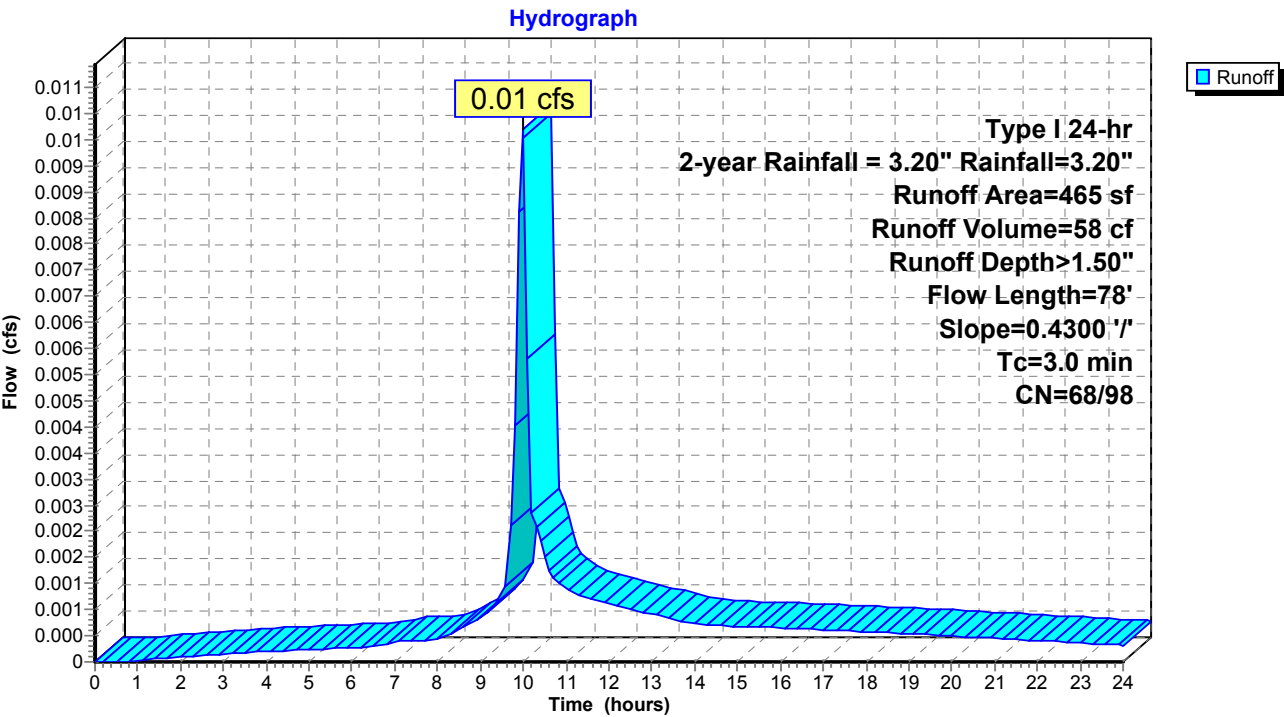
Runoff = 0.01 cfs @ 9.98 hrs, Volume= 58 cf, Depth> 1.50"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
305	68	<50% Grass cover, Poor, HSG A
160	98	Unconnected pavement, HSG A
465	78	Weighted Average
305	68	65.59% Pervious Area
160	98	34.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-11: House Entry Pavement, MTL5 Buttress, Ex/Borrow Area



Summary for Subcatchment SC-12: MTL5 Buttress, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

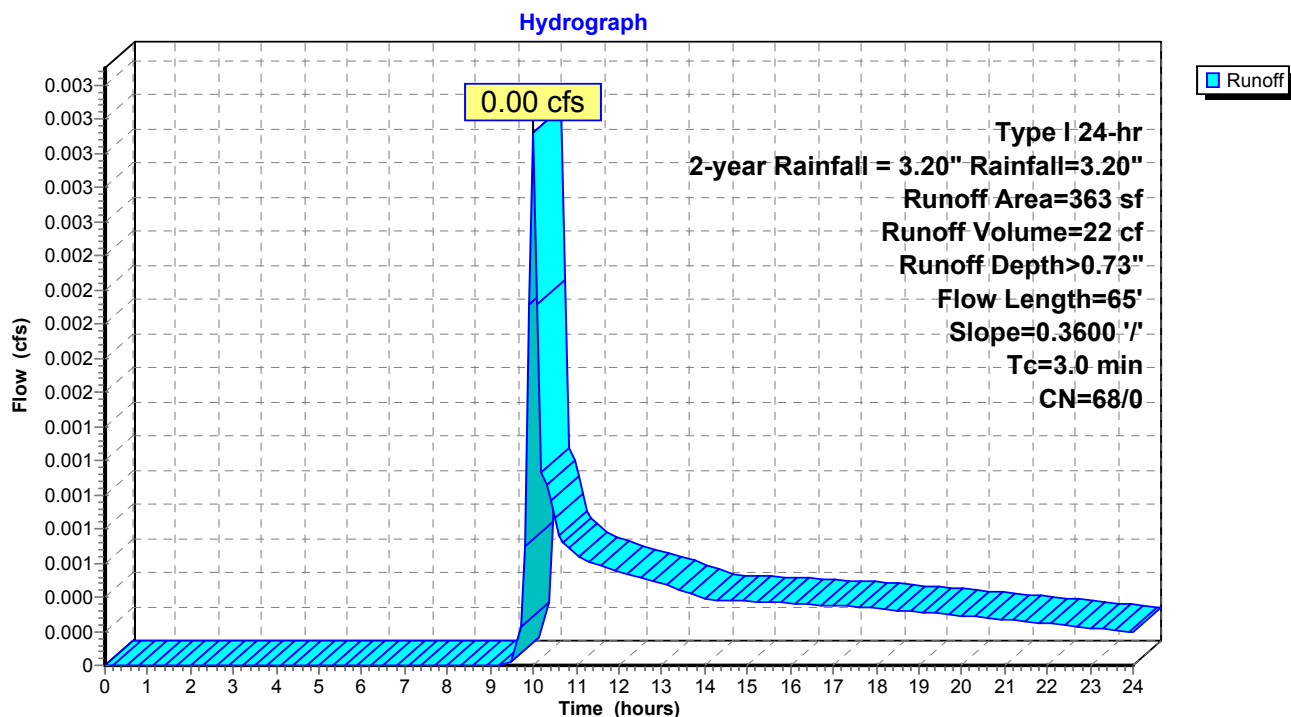
Runoff = 0.00 cfs @ 10.00 hrs, Volume= 22 cf, Depth> 0.73"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
363	68	<50% Grass cover, Poor, HSG A
363	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	65	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-12: MTL5 Buttress, Ex/Borrow Area



Summary for Subcatchment SC-17: LS Debris, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

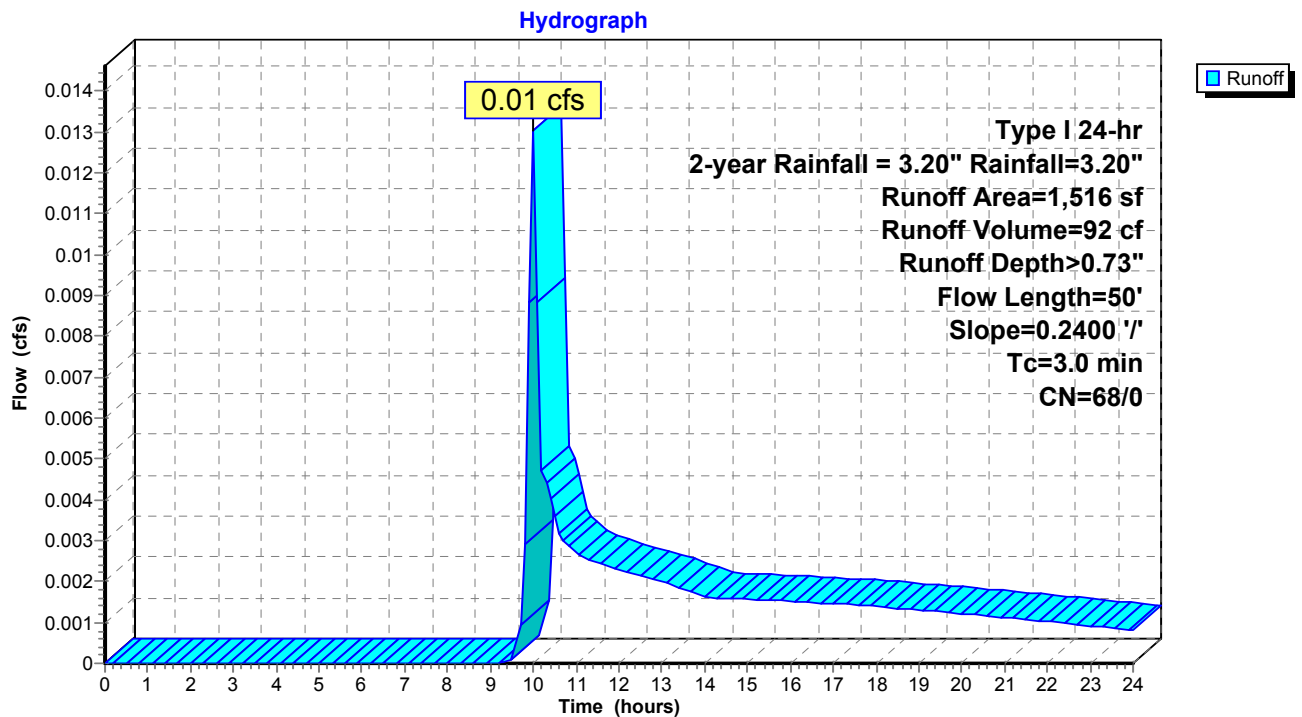
Runoff = 0.01 cfs @ 10.00 hrs, Volume= 92 cf, Depth> 0.73"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
1,516	68	<50% Grass cover, Poor, HSG A
1,516	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-17: LS Debris, Ex/Borrow Area



Summary for Subcatchment SC-18: LS Debris, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

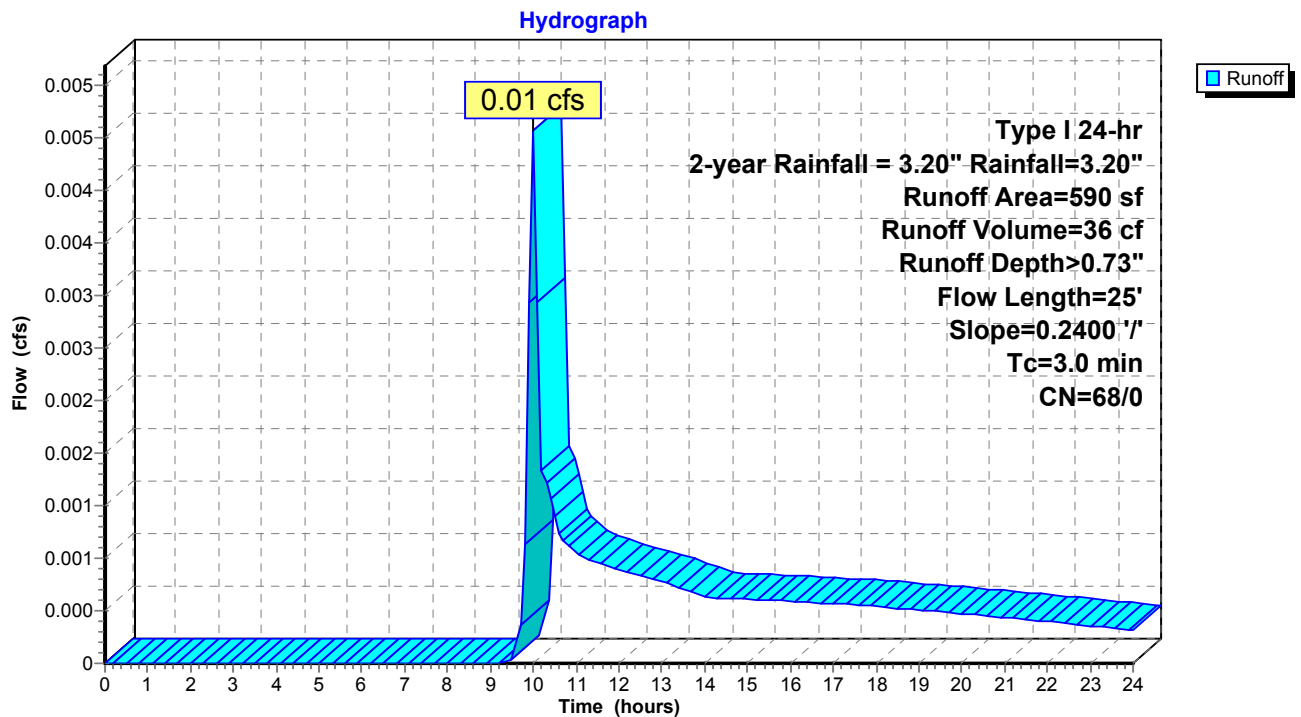
Runoff = 0.01 cfs @ 10.00 hrs, Volume= 36 cf, Depth> 0.73"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
590	68	<50% Grass cover, Poor, HSG A
590	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-18: LS Debris, Ex/Borrow Area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

[45] Hint: Runoff=Zero

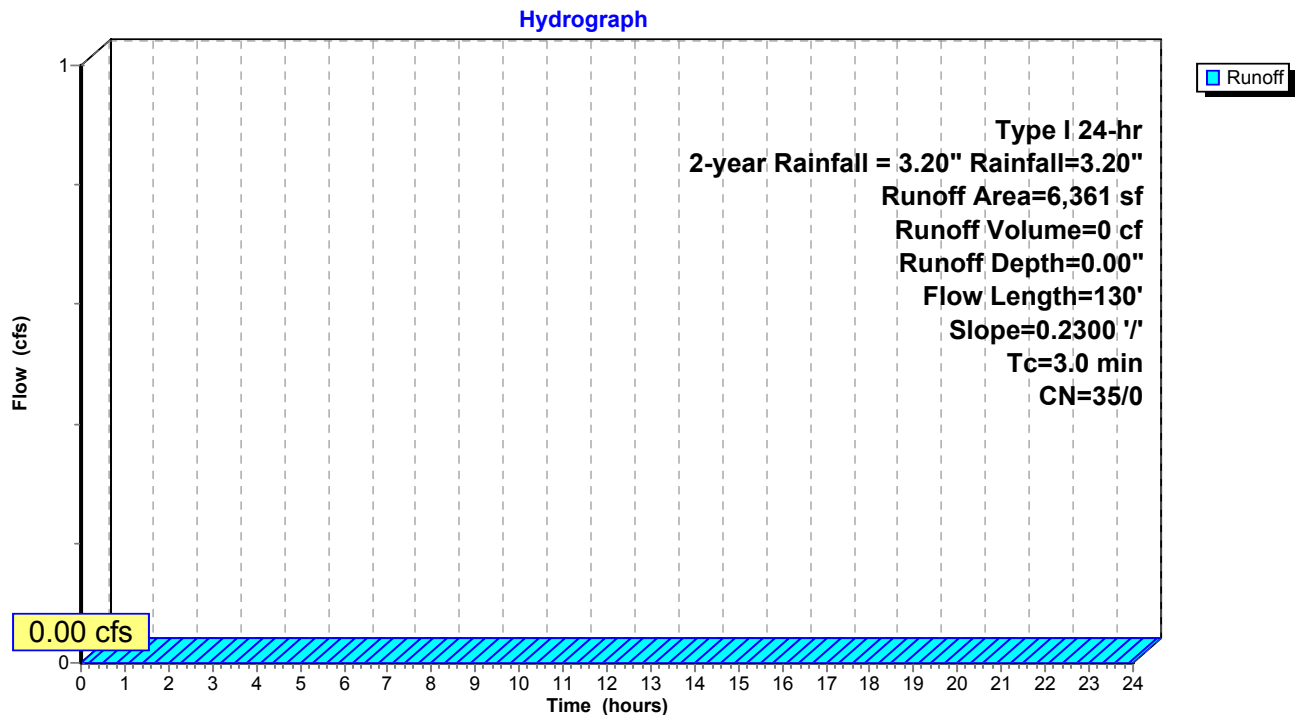
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

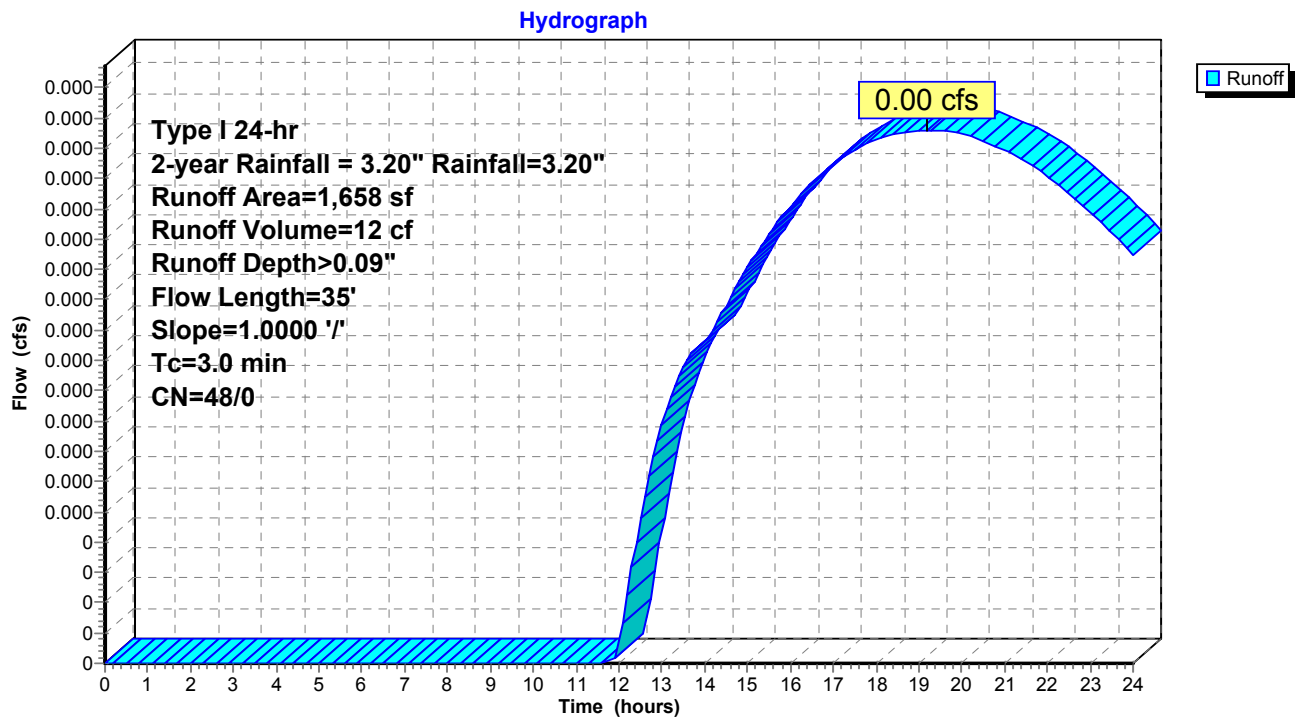
Runoff = 0.00 cfs @ 19.20 hrs, Volume= 12 cf, Depth> 0.09"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

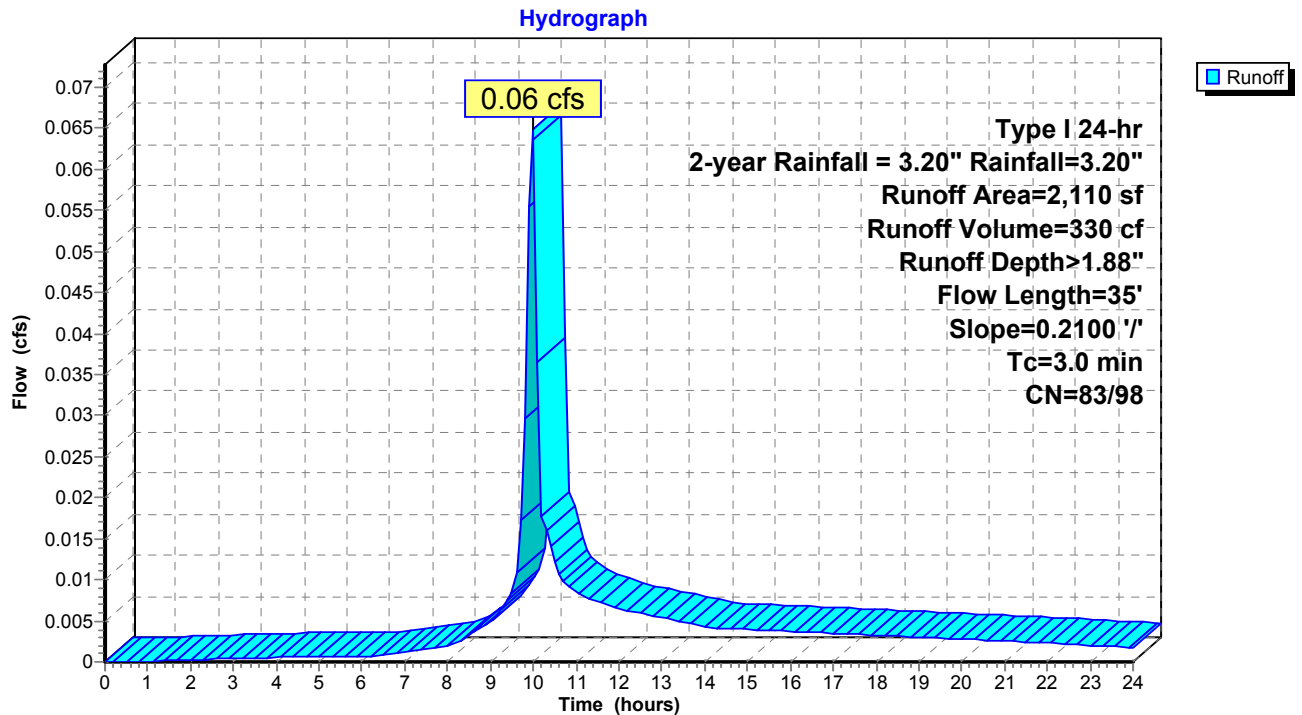
Runoff = 0.06 cfs @ 9.97 hrs, Volume= 330 cf, Depth> 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.7	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-21: Beach area



Summary for Subcatchment SC-7: Carport Driveway, East Side Yard, Upper MTLS Buttress

[49] Hint: Tc<2dt may require smaller dt

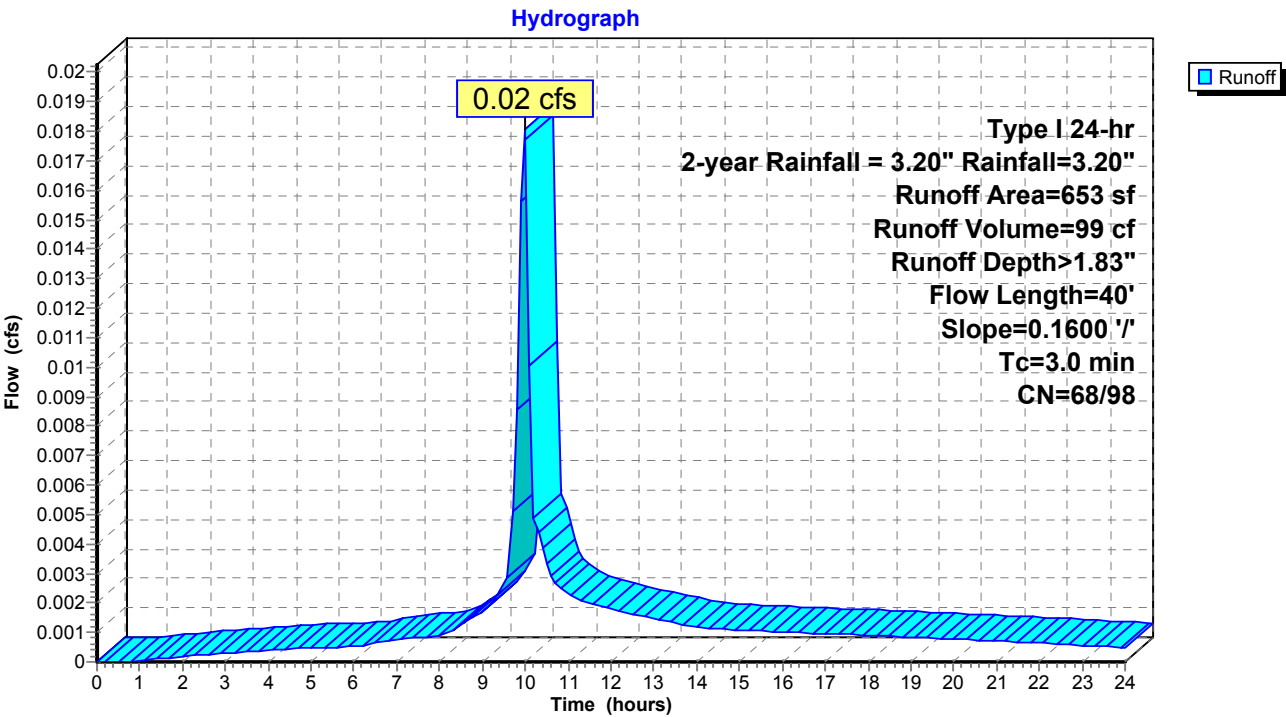
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 99 cf, Depth> 1.83"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
* 320	98	Impervious
333	68	<50% Grass cover, Poor, HSG A
653	83	Weighted Average
333	68	51.00% Pervious Area
320	98	49.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	40	0.1600	2.05		Sheet Flow, n= 0.015 P2= 3.20"
0.3	40	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-7: Carport Driveway, East Side Yard, Upper MTLS Buttress



Summary for Subcatchment SC-8: MTL5 Buttress

[49] Hint: $T_c < 2dt$ may require smaller dt

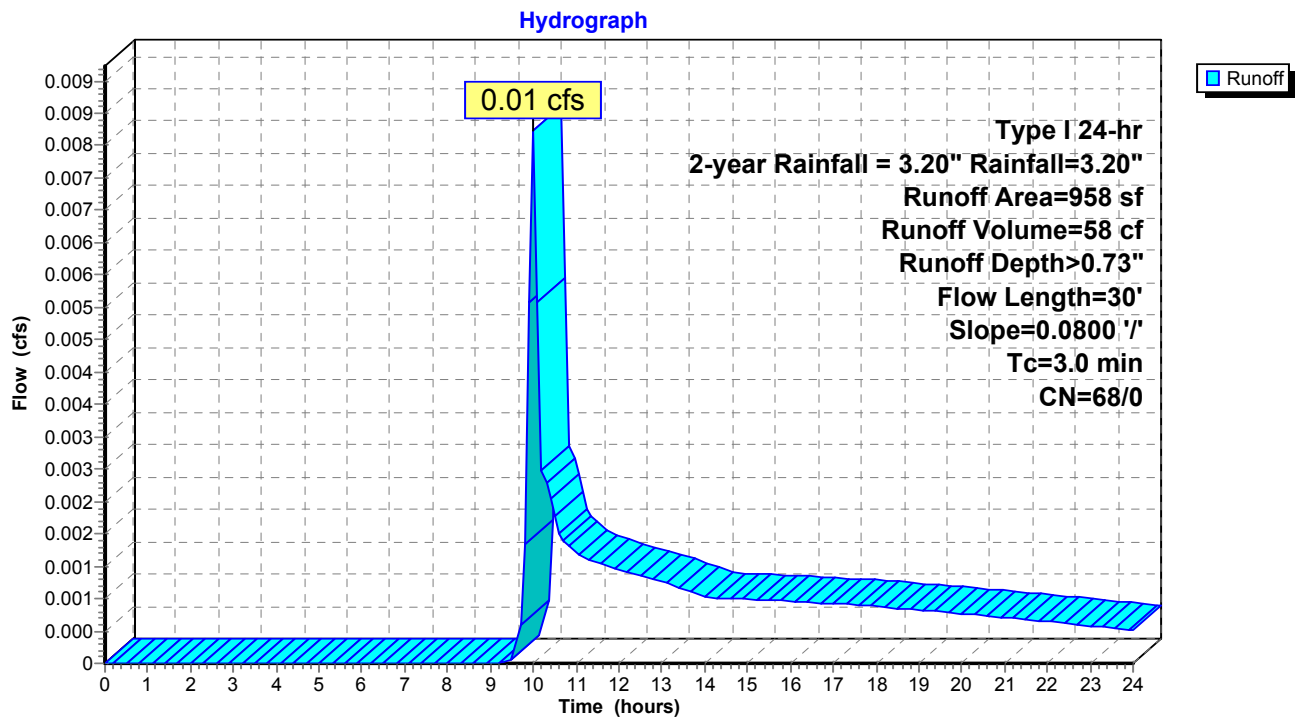
Runoff = 0.01 cfs @ 10.00 hrs, Volume= 58 cf, Depth> 0.73"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
958	68	<50% Grass cover, Poor, HSG A
958	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0800	1.47		Sheet Flow, n= 0.015 P2= 3.20"
0.3	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-8: MTL5 Buttress



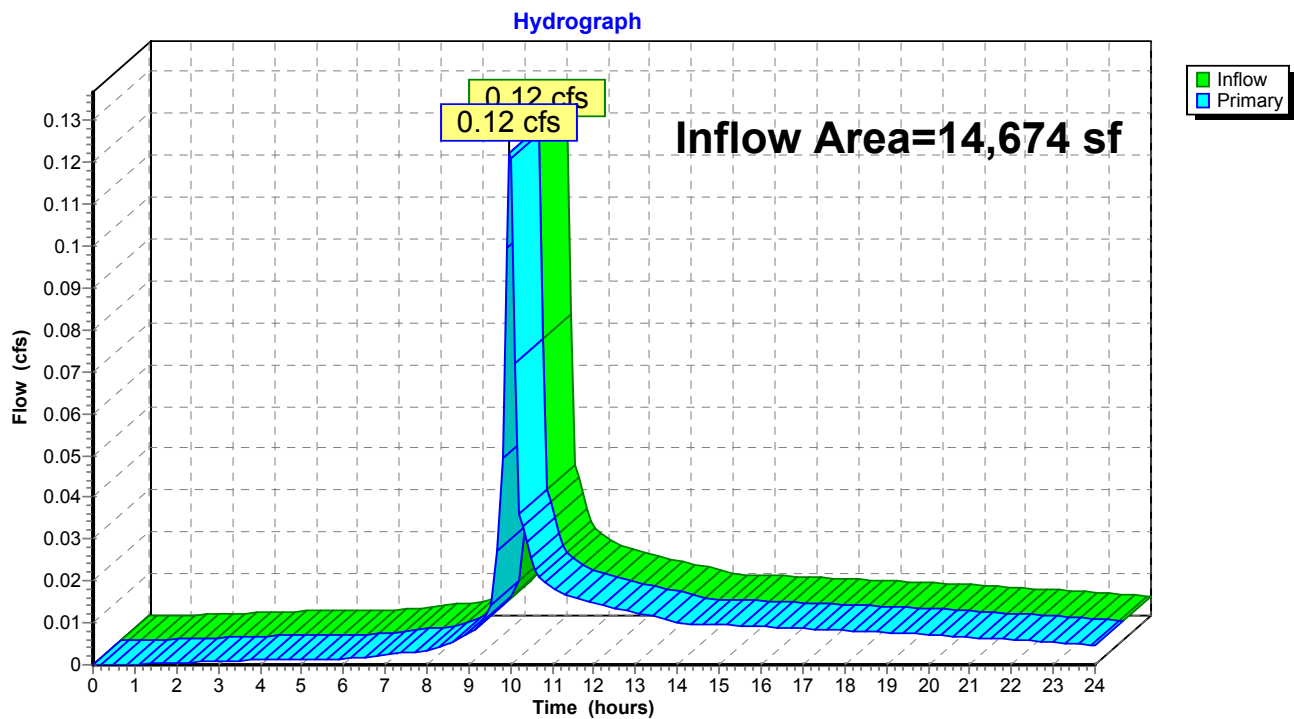
Summary for Pond WST B: Hypothetical Water Storage Tank B

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 14,674 sf, 6.11% Impervious, Inflow Depth > 0.58" for 2-year Rainfall = 3.20" event
Inflow = 0.12 cfs @ 9.98 hrs, Volume= 709 cf
Primary = 0.12 cfs @ 9.98 hrs, Volume= 709 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Pond WST B: Hypothetical Water Storage Tank B



1925 ECDLL_Current Conditions Analysis Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Prepared by {enter your company name here}

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: House Entry Pavement, Runoff Area=465 sf 34.41% Impervious Runoff Depth>2.56"
Flow Length=78' Slope=0.4300 '/' Tc=3.0 min CN=68/98 Runoff=0.02 cfs 99 cf

Subcatchment SC-12: MTLs Buttress, Runoff Area=363 sf 0.00% Impervious Runoff Depth>1.61"
Flow Length=65' Slope=0.3600 '/' Tc=3.0 min CN=68/0 Runoff=0.01 cfs 49 cf

Subcatchment SC-17: LS Debris, Ex/Borrow Runoff Area=1,516 sf 0.00% Impervious Runoff Depth>1.61"
Flow Length=50' Slope=0.2400 '/' Tc=3.0 min CN=68/0 Runoff=0.04 cfs 203 cf

Subcatchment SC-18: LS Debris, Ex/Borrow Runoff Area=590 sf 0.00% Impervious Runoff Depth>1.61"
Flow Length=25' Slope=0.2400 '/' Tc=3.0 min CN=68/0 Runoff=0.01 cfs 79 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth>0.04"
Flow Length=130' Slope=0.2300 '/' Tc=3.0 min CN=35/0 Runoff=0.00 cfs 22 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.45"
Flow Length=35' Slope=1.0000 '/' Tc=3.0 min CN=48/0 Runoff=0.00 cfs 62 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>3.13"
Flow Length=35' Slope=0.2100 '/' Tc=3.0 min CN=83/98 Runoff=0.11 cfs 550 cf

Subcatchment SC-7: Carport Driveway, East Runoff Area=653 sf 49.00% Impervious Runoff Depth>2.96"
Flow Length=40' Slope=0.1600 '/' Tc=3.0 min CN=68/98 Runoff=0.03 cfs 161 cf

Subcatchment SC-8: MTLs Buttress Runoff Area=958 sf 0.00% Impervious Runoff Depth>1.61"
Flow Length=30' Slope=0.0800 '/' Tc=3.0 min CN=68/0 Runoff=0.02 cfs 128 cf

Pond WST B: Hypothetical Water Storage Tank B

Inflow=0.24 cfs 1,352 cf

Primary=0.24 cfs 1,352 cf

Total Runoff Area = 14,674 sf Runoff Volume = 1,352 cf Average Runoff Depth = 1.11"
93.89% Pervious = 13,778 sf 6.11% Impervious = 896 sf

Summary for Subcatchment SC-11: House Entry Pavement, MTL5 Buttress, Ex/Borrow Area

[49] Hint: Tc<2dt may require smaller dt

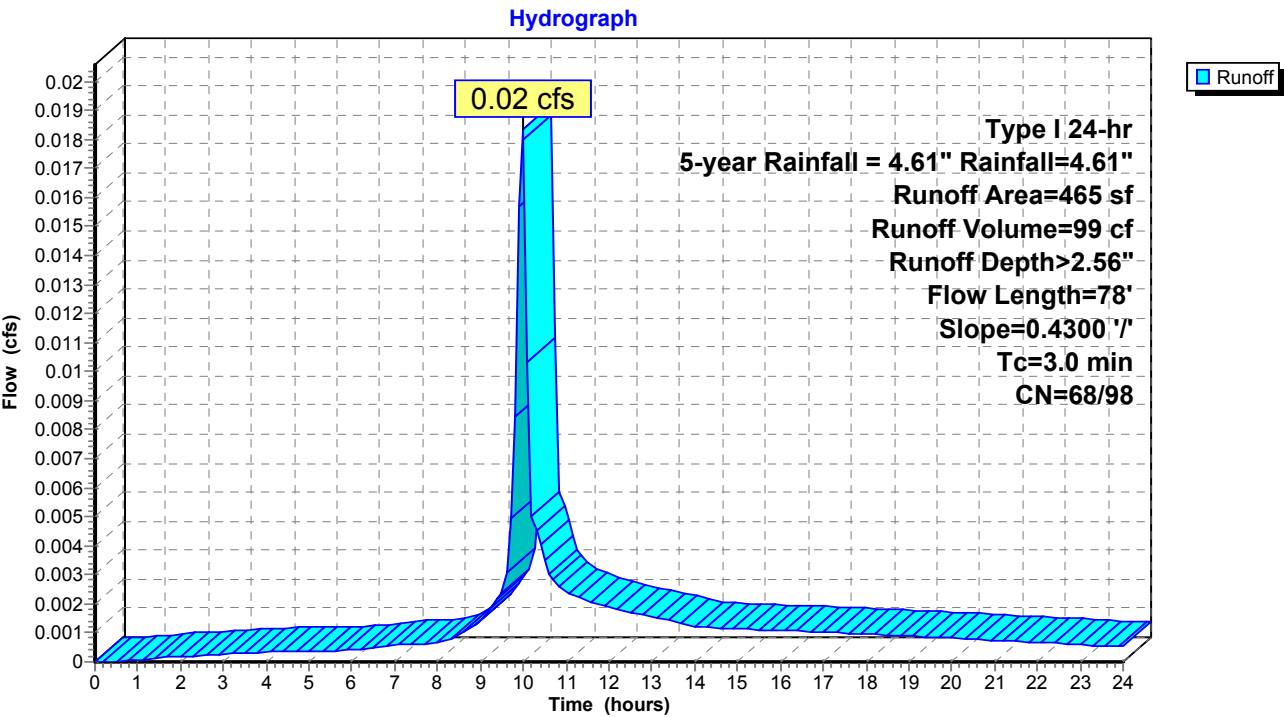
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 99 cf, Depth> 2.56"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
305	68	<50% Grass cover, Poor, HSG A
160	98	Unconnected pavement, HSG A
465	78	Weighted Average
305	68	65.59% Pervious Area
160	98	34.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow,
					Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-11: House Entry Pavement, MTL5 Buttress, Ex/Borrow Area



Summary for Subcatchment SC-12: MTL5 Buttress, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

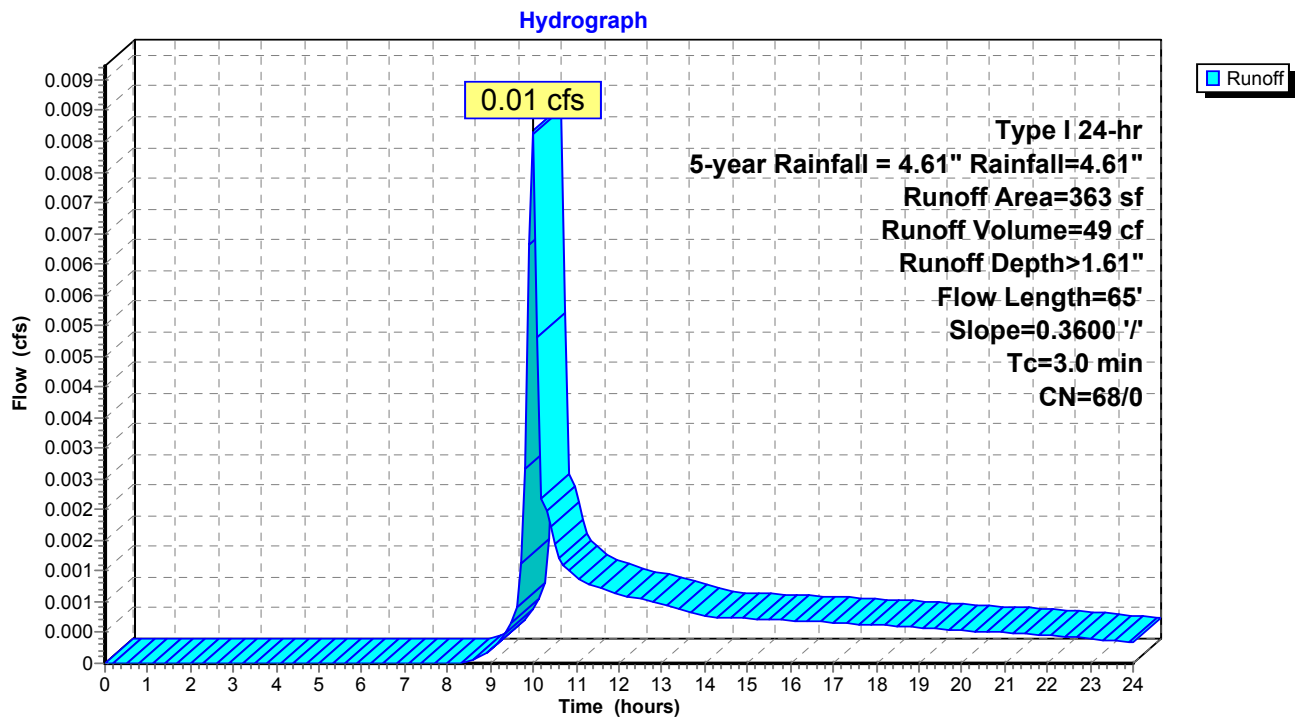
Runoff = 0.01 cfs @ 9.99 hrs, Volume= 49 cf, Depth> 1.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
363	68	<50% Grass cover, Poor, HSG A
363	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	65	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-12: MTL5 Buttress, Ex/Borrow Area



Summary for Subcatchment SC-17: LS Debris, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

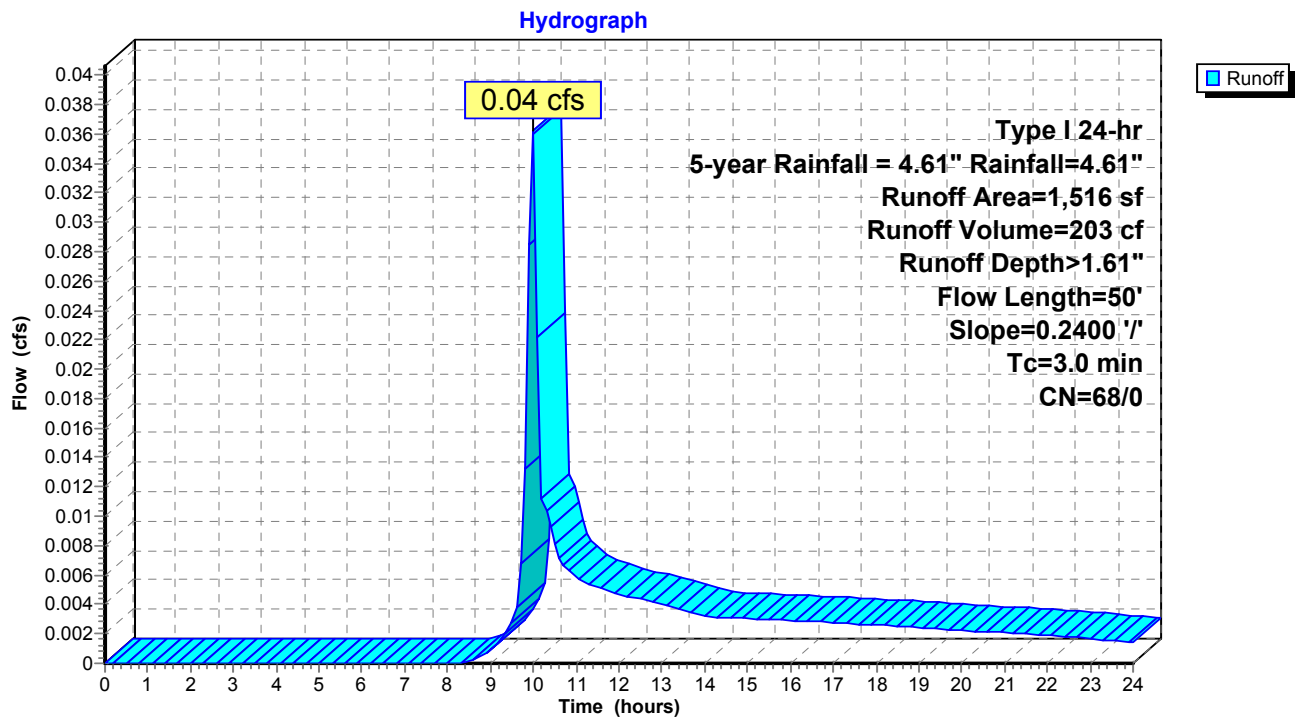
Runoff = 0.04 cfs @ 9.99 hrs, Volume= 203 cf, Depth> 1.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
1,516	68	<50% Grass cover, Poor, HSG A
1,516	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.9	50	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-17: LS Debris, Ex/Borrow Area



Summary for Subcatchment SC-18: LS Debris, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

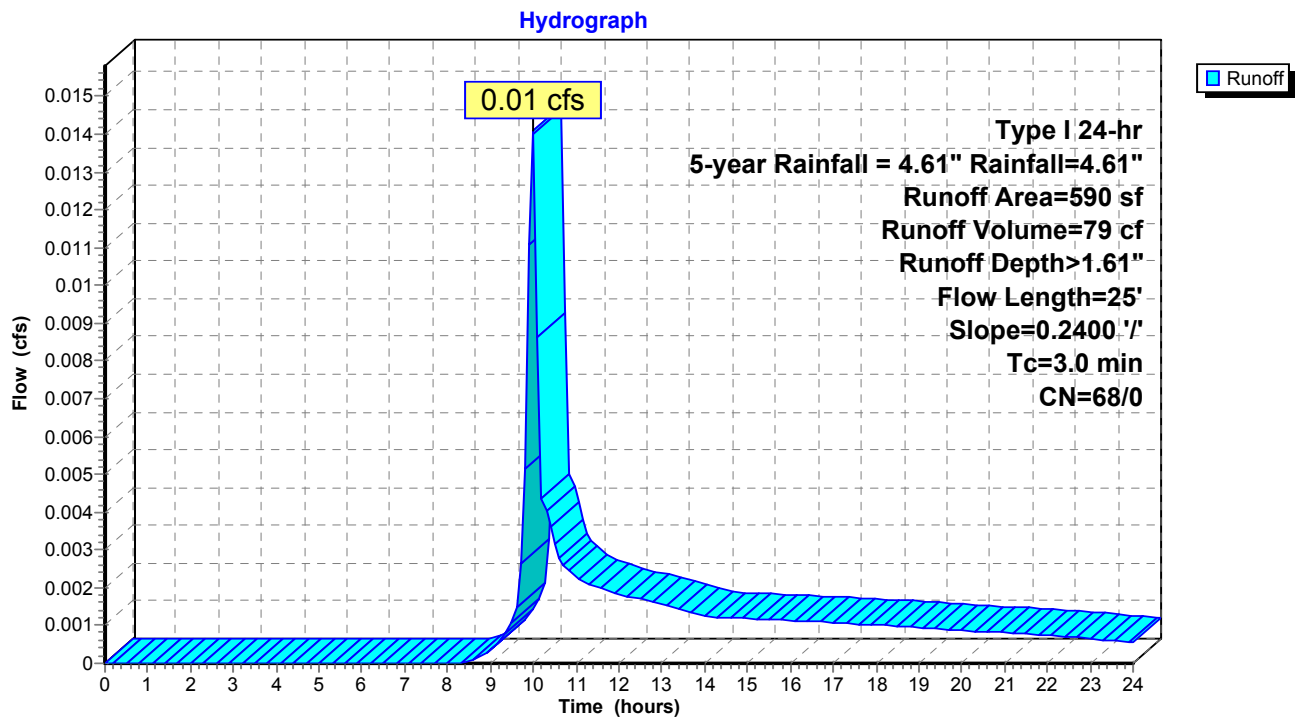
Runoff = 0.01 cfs @ 9.99 hrs, Volume= 79 cf, Depth> 1.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
590	68	<50% Grass cover, Poor, HSG A
590	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-18: LS Debris, Ex/Borrow Area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

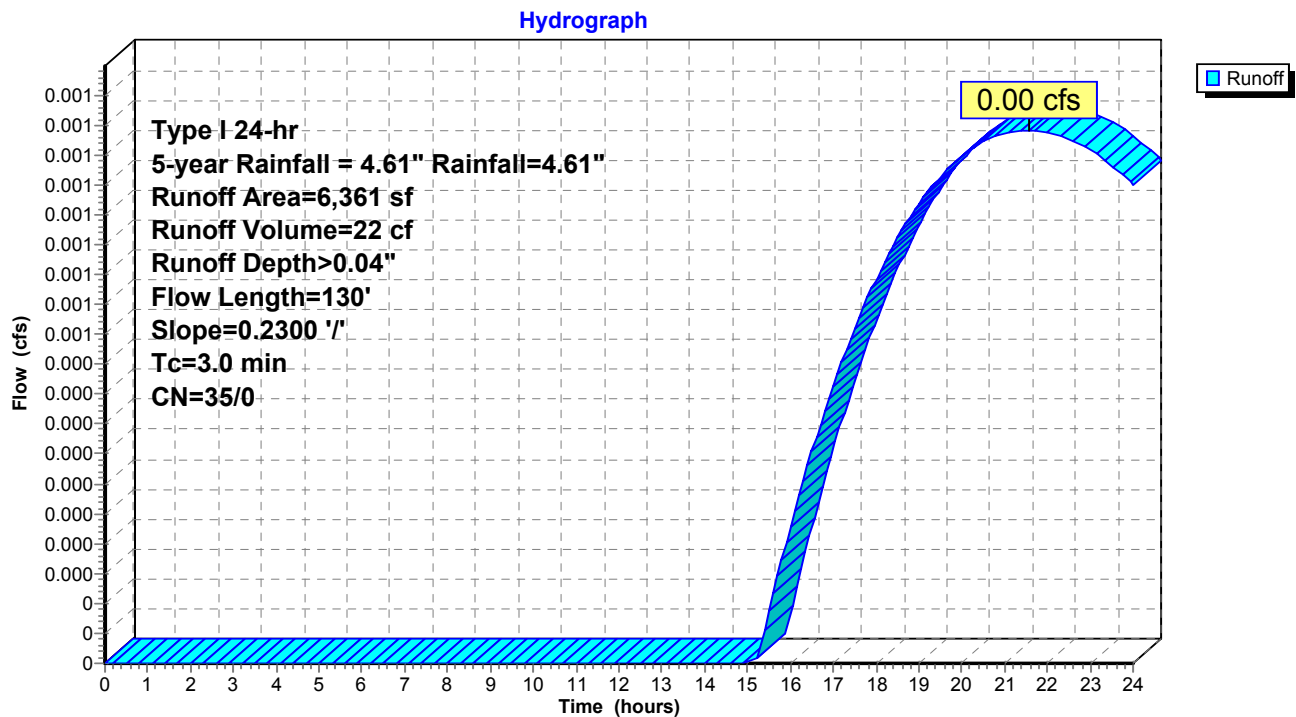
Runoff = 0.00 cfs @ 21.55 hrs, Volume= 22 cf, Depth> 0.04"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

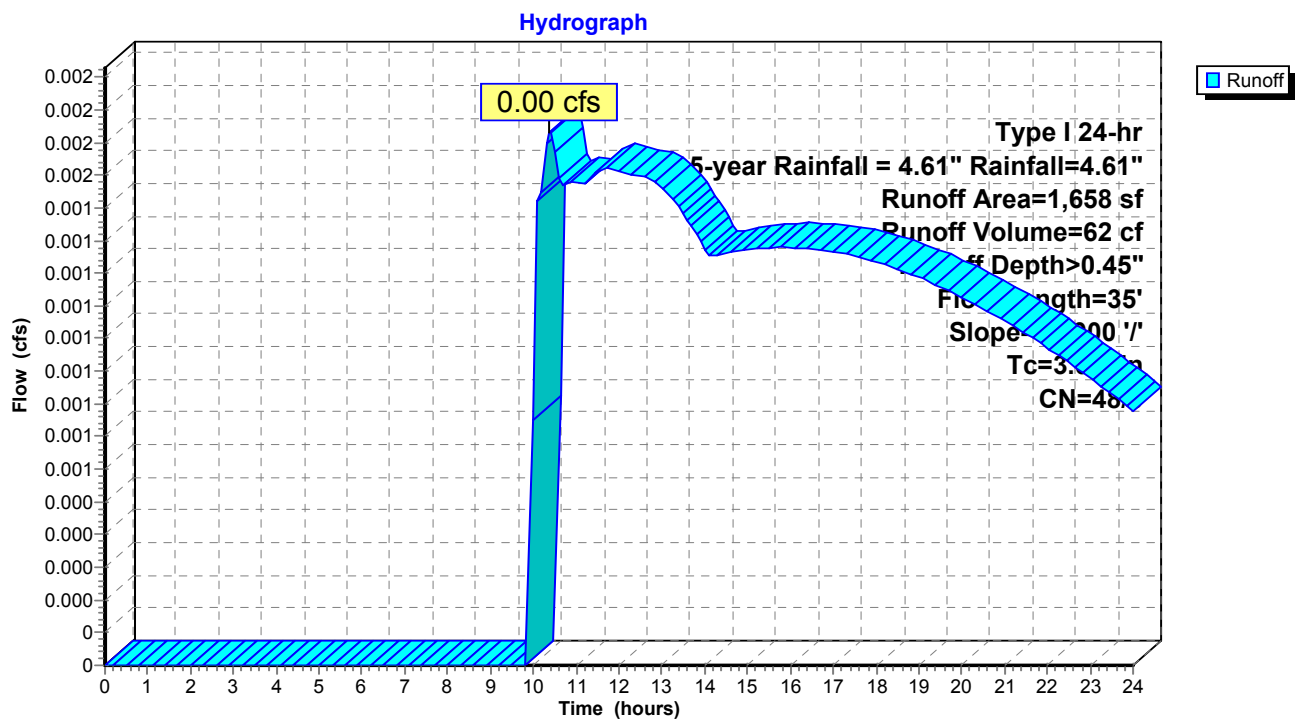
Runoff = 0.00 cfs @ 10.39 hrs, Volume= 62 cf, Depth> 0.45"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.4	35	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

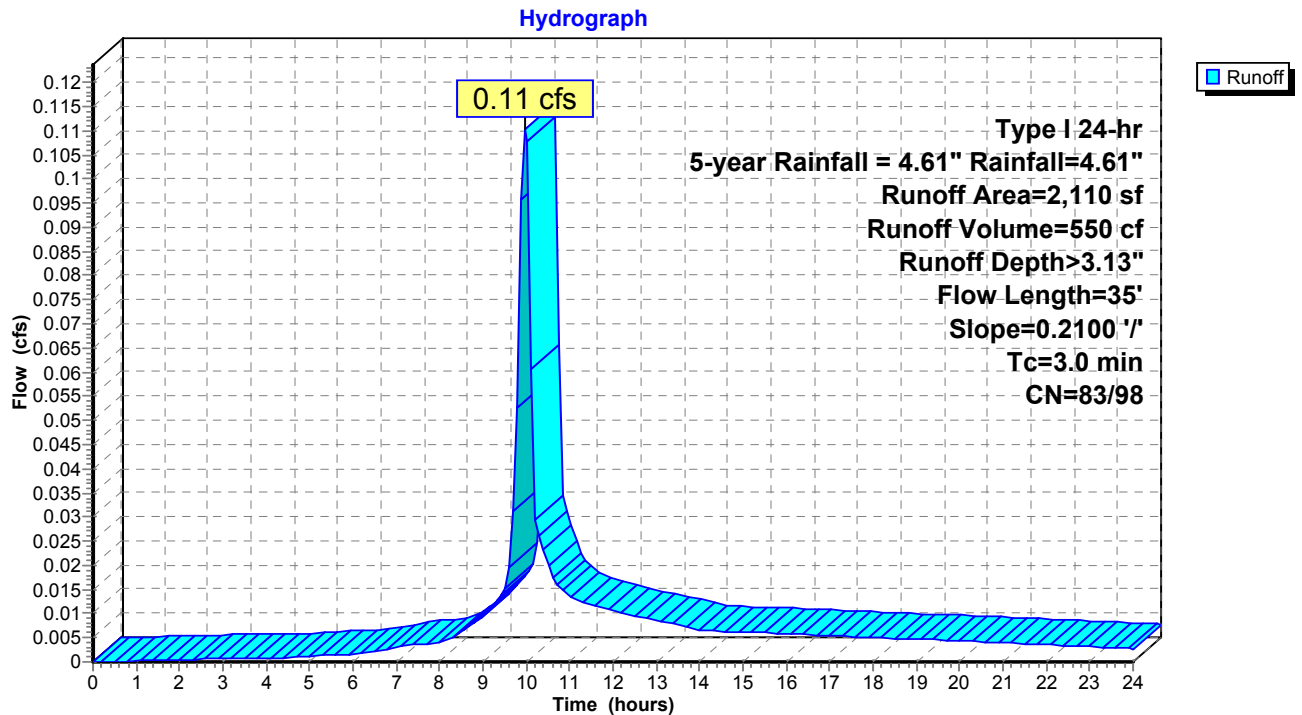
Runoff = 0.11 cfs @ 9.97 hrs, Volume= 550 cf, Depth> 3.13"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.7	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-21: Beach area



Summary for Subcatchment SC-7: Carport Driveway, East Side Yard, Upper MTLS Buttress

[49] Hint: Tc<2dt may require smaller dt

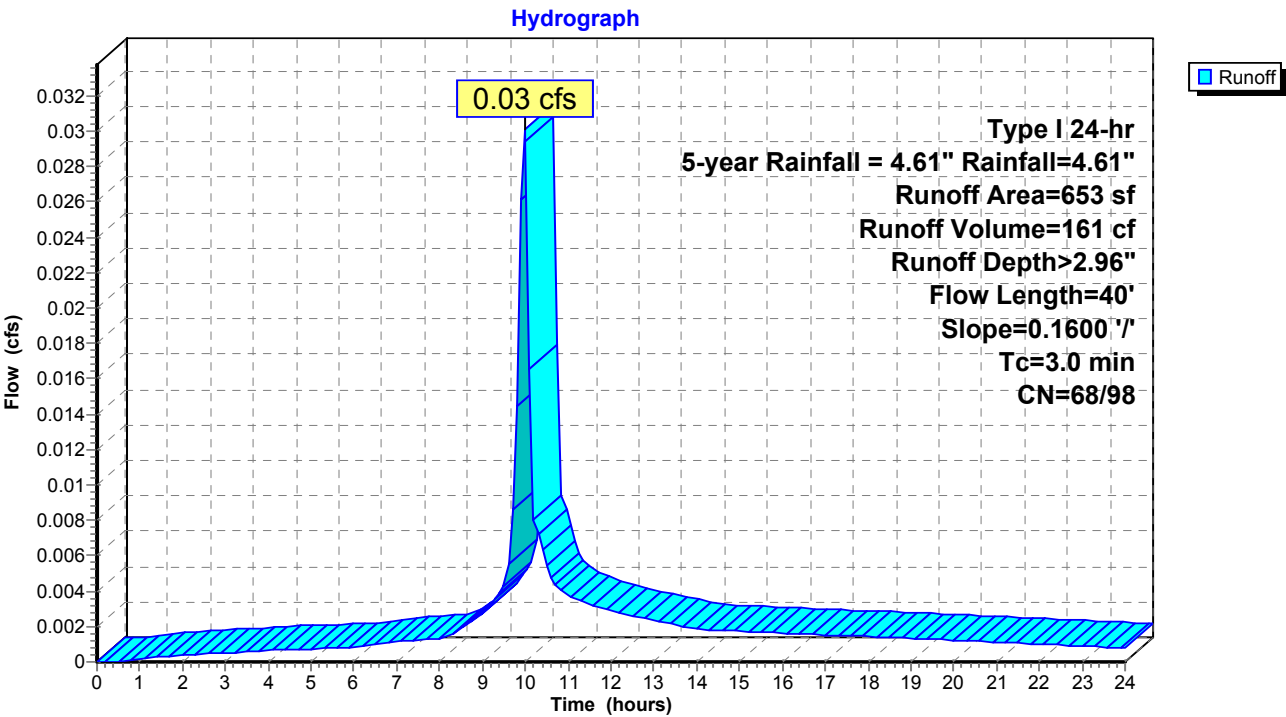
Runoff = 0.03 cfs @ 9.97 hrs, Volume= 161 cf, Depth> 2.96"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
* 320	98	Impervious
333	68	<50% Grass cover, Poor, HSG A
653	83	Weighted Average
333	68	51.00% Pervious Area
320	98	49.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	40	0.1600	2.05		Sheet Flow, n= 0.015 P2= 3.20"
0.3	40	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-7: Carport Driveway, East Side Yard, Upper MTLS Buttress



Summary for Subcatchment SC-8: MTL5 Buttress

[49] Hint: $T_c < 2dt$ may require smaller dt

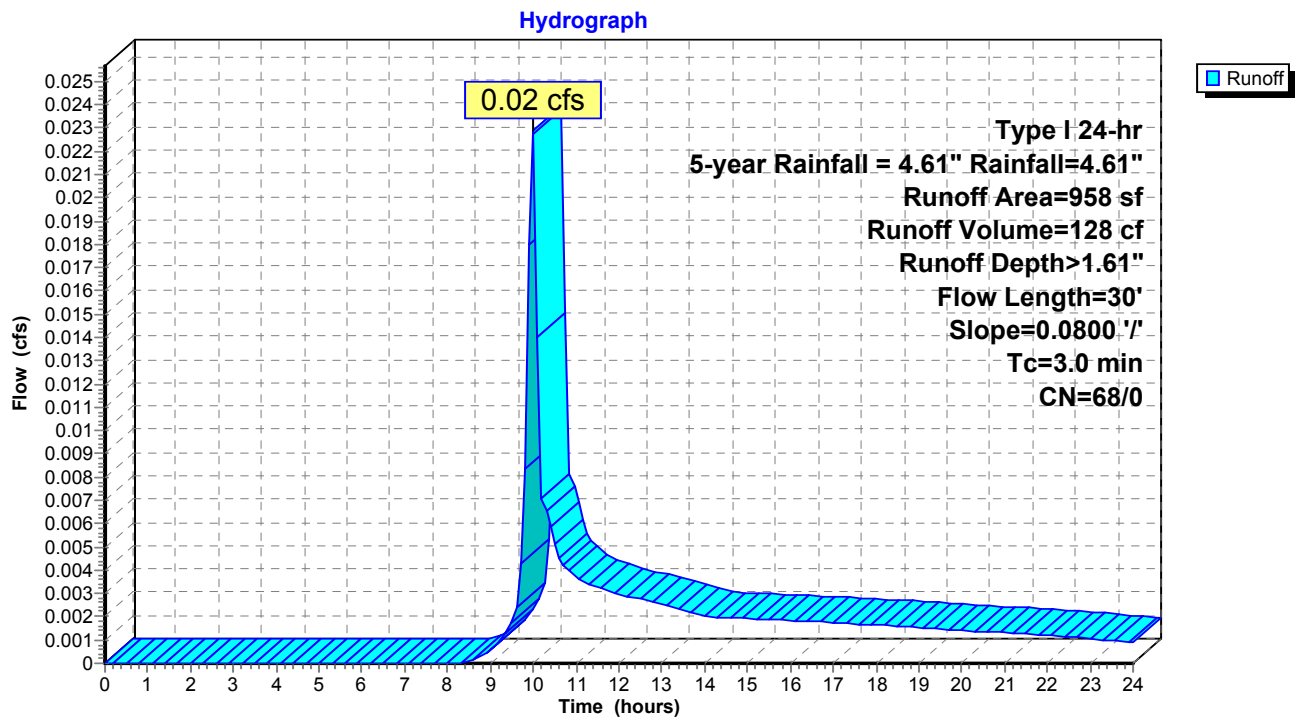
Runoff = 0.02 cfs @ 9.99 hrs, Volume= 128 cf, Depth> 1.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
958	68	<50% Grass cover, Poor, HSG A
958	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0800	1.47		Sheet Flow, n= 0.015 P2= 3.20"
0.3	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-8: MTL5 Buttress



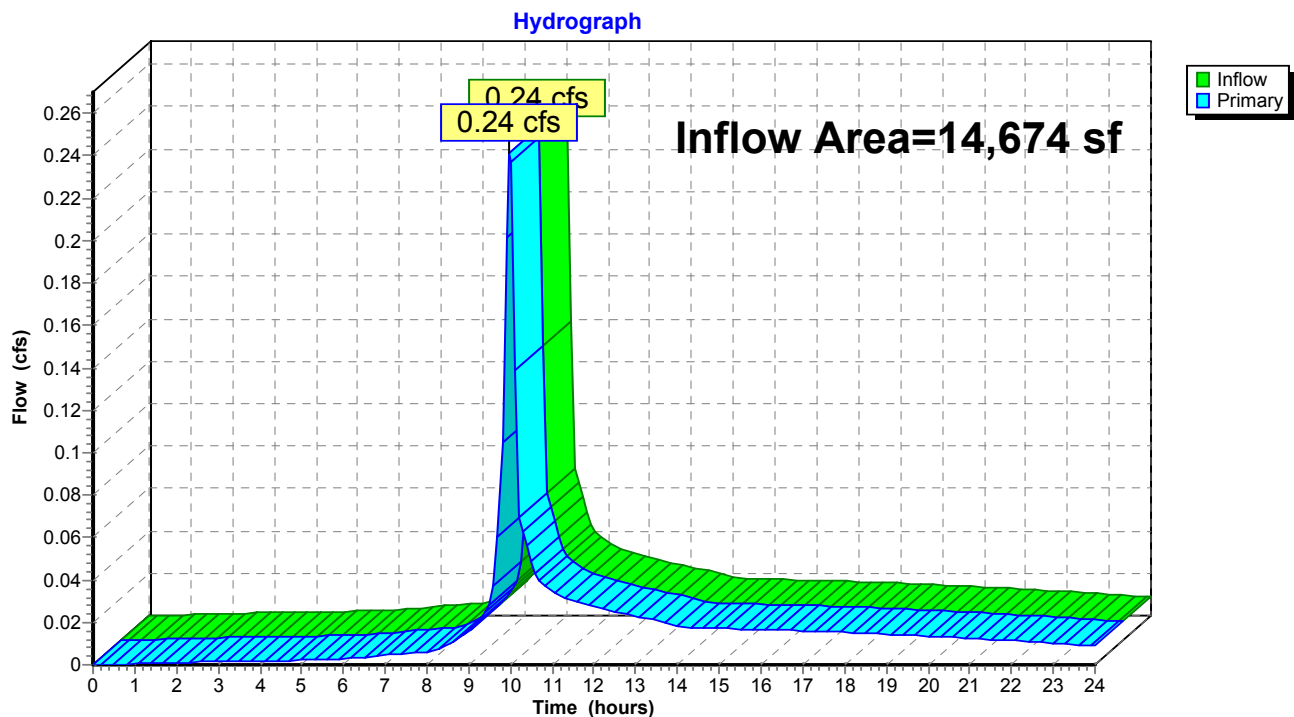
Summary for Pond WST B: Hypothetical Water Storage Tank B

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 14,674 sf, 6.11% Impervious, Inflow Depth > 1.11" for 5-year Rainfall = 4.61" event
Inflow = 0.24 cfs @ 9.98 hrs, Volume= 1,352 cf
Primary = 0.24 cfs @ 9.98 hrs, Volume= 1,352 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Pond WST B: Hypothetical Water Storage Tank B



Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: House Entry Pavement, Runoff Area=465 sf 34.41% Impervious Runoff Depth>3.32"
Flow Length=78' Slope=0.4300 '/ Tc=3.0 min CN=68/98 Runoff=0.02 cfs 129 cf

Subcatchment SC-12: MTL5 Buttrass, Runoff Area=363 sf 0.00% Impervious Runoff Depth>2.28"
Flow Length=65' Slope=0.3600 '/ Tc=3.0 min CN=68/0 Runoff=0.01 cfs 69 cf

Subcatchment SC-17: LS Debris, Ex/Borrow Runoff Area=1,516 sf 0.00% Impervious Runoff Depth>2.28"
Flow Length=50' Slope=0.2400 '/ Tc=3.0 min CN=68/0 Runoff=0.05 cfs 288 cf

Subcatchment SC-18: LS Debris, Ex/Borrow Runoff Area=590 sf 0.00% Impervious Runoff Depth>2.28"
Flow Length=25' Slope=0.2400 '/ Tc=3.0 min CN=68/0 Runoff=0.02 cfs 112 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth>0.16"
Flow Length=130' Slope=0.2300 '/ Tc=3.0 min CN=35/0 Runoff=0.00 cfs 87 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.80"
Flow Length=35' Slope=1.0000 '/ Tc=3.0 min CN=48/0 Runoff=0.01 cfs 111 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>4.00"
Flow Length=35' Slope=0.2100 '/ Tc=3.0 min CN=83/98 Runoff=0.14 cfs 702 cf

Subcatchment SC-7: Carport Driveway, East Runoff Area=653 sf 49.00% Impervious Runoff Depth>3.76"
Flow Length=40' Slope=0.1600 '/ Tc=3.0 min CN=68/98 Runoff=0.04 cfs 205 cf

Subcatchment SC-8: MTL5 Buttrass Runoff Area=958 sf 0.00% Impervious Runoff Depth>2.28"
Flow Length=30' Slope=0.0800 '/ Tc=3.0 min CN=68/0 Runoff=0.03 cfs 182 cf

Pond WST B: Hypothetical Water Storage Tank B

Inflow=0.33 cfs 1,885 cf

Primary=0.33 cfs 1,885 cf

Total Runoff Area = 14,674 sf Runoff Volume = 1,885 cf Average Runoff Depth = 1.54"
93.89% Pervious = 13,778 sf 6.11% Impervious = 896 sf

Summary for Subcatchment SC-11: House Entry Pavement, MTL5 Buttress, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

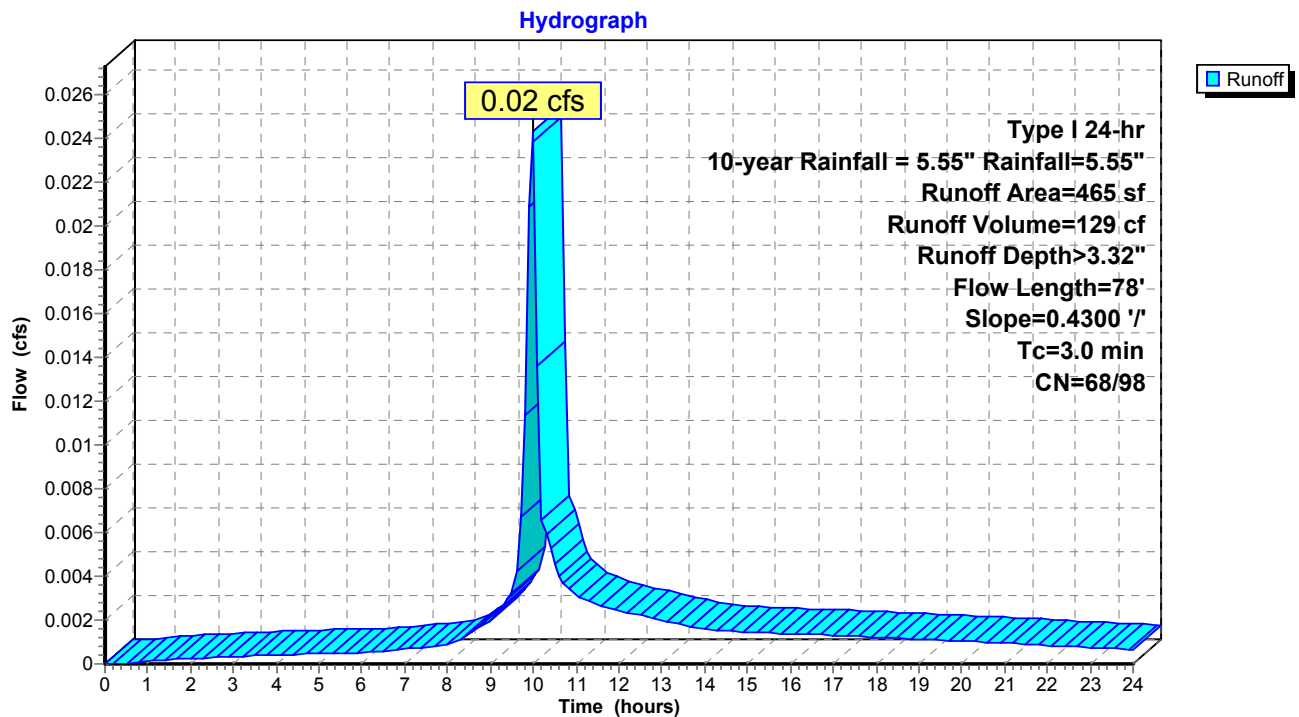
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 129 cf, Depth> 3.32"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
305	68	<50% Grass cover, Poor, HSG A
160	98	Unconnected pavement, HSG A
465	78	Weighted Average
305	68	65.59% Pervious Area
160	98	34.41% Impervious Area

T_c (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
1.0	78	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-11: House Entry Pavement, MTL5 Buttress, Ex/Borrow Area



Summary for Subcatchment SC-12: MTLs Buttress, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

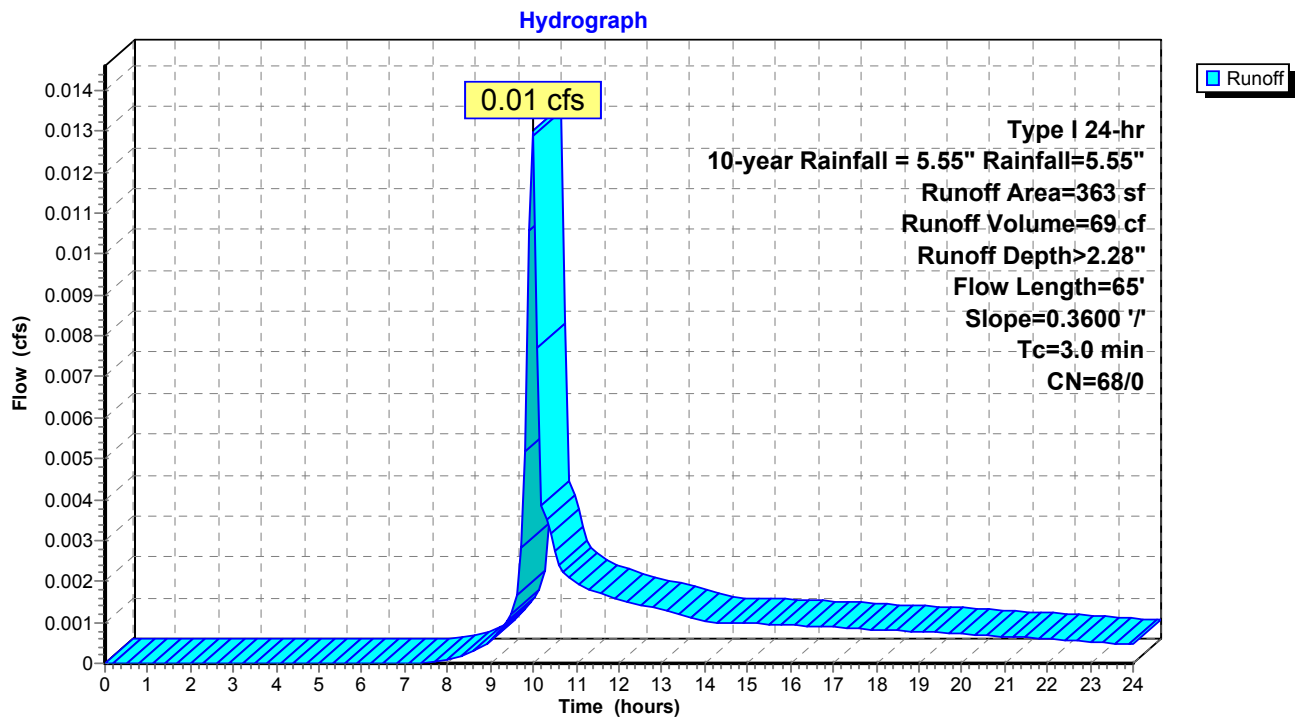
Runoff = 0.01 cfs @ 9.98 hrs, Volume= 69 cf, Depth> 2.28"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
363	68	<50% Grass cover, Poor, HSG A
363	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	65	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-12: MTLs Buttress, Ex/Borrow Area



Summary for Subcatchment SC-17: LS Debris, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

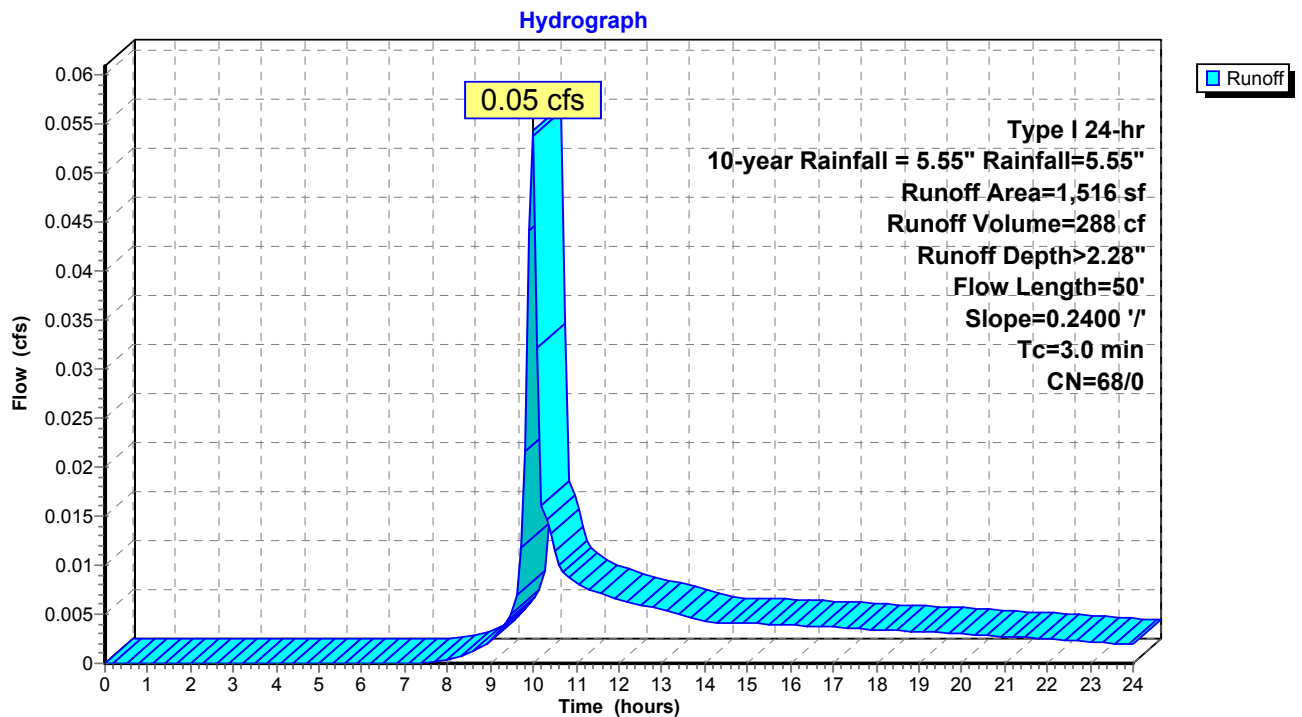
Runoff = 0.05 cfs @ 9.98 hrs, Volume= 288 cf, Depth> 2.28"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
1,516	68	<50% Grass cover, Poor, HSG A
1,516	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-17: LS Debris, Ex/Borrow Area



Summary for Subcatchment SC-18: LS Debris, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

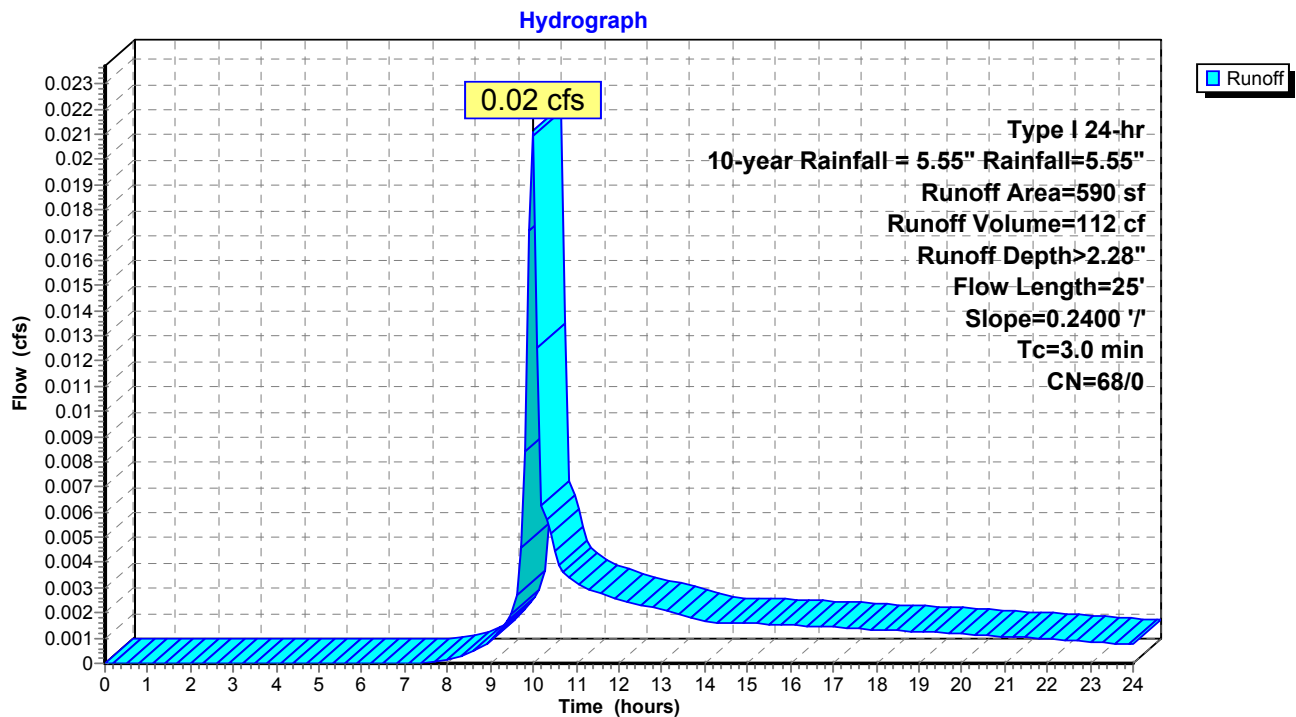
Runoff = 0.02 cfs @ 9.98 hrs, Volume= 112 cf, Depth> 2.28"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
590	68	<50% Grass cover, Poor, HSG A
590	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-18: LS Debris, Ex/Borrow Area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

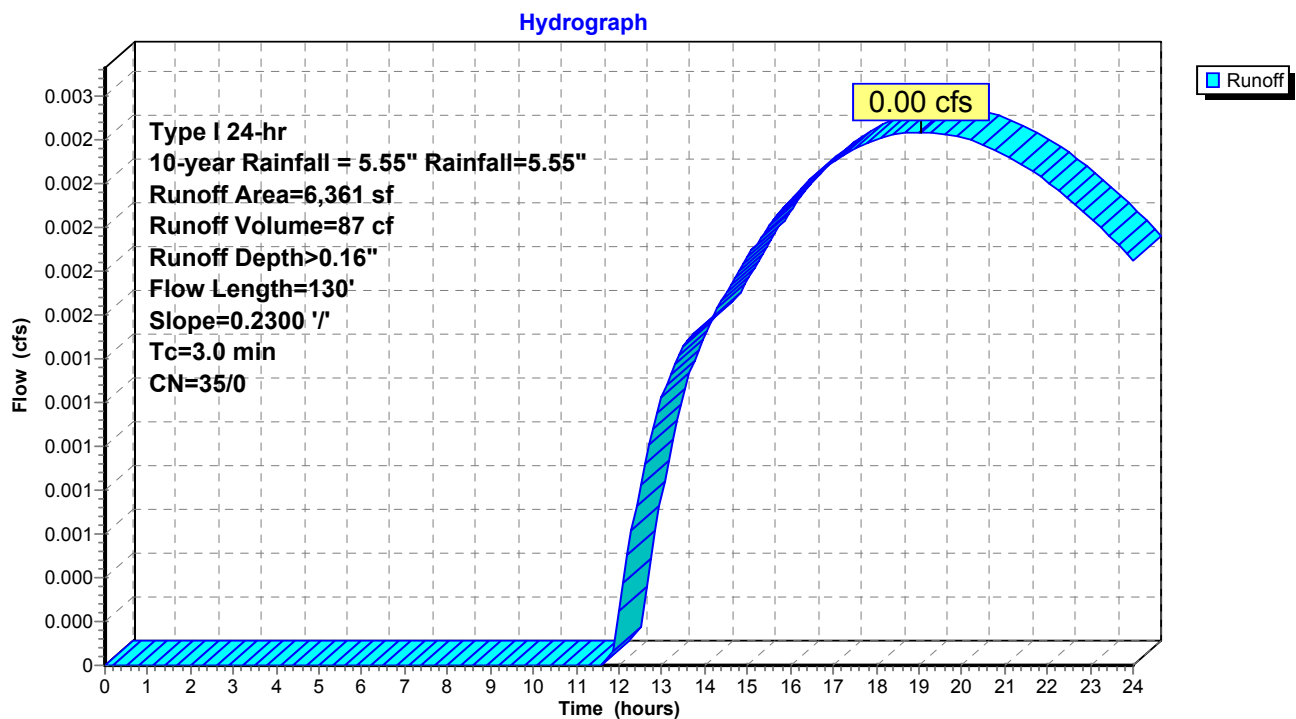
Runoff = 0.00 cfs @ 19.06 hrs, Volume= 87 cf, Depth> 0.16"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

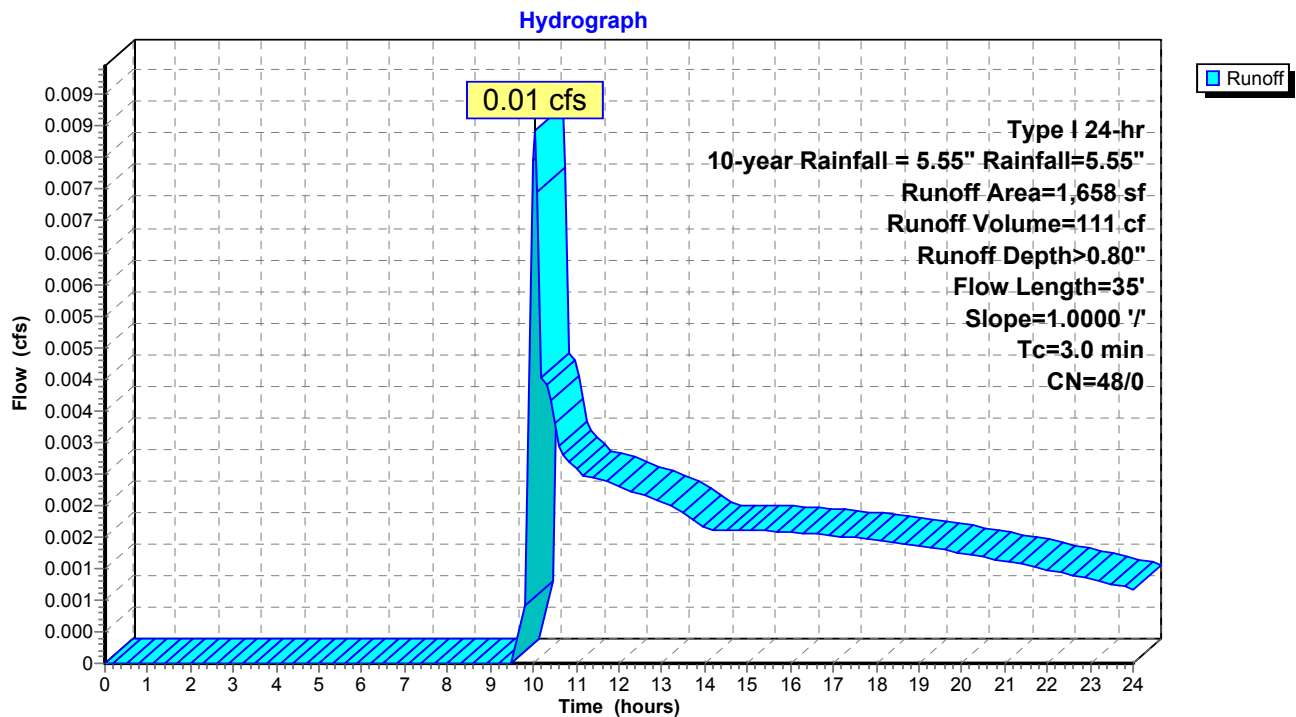
Runoff = 0.01 cfs @ 10.04 hrs, Volume= 111 cf, Depth> 0.80"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

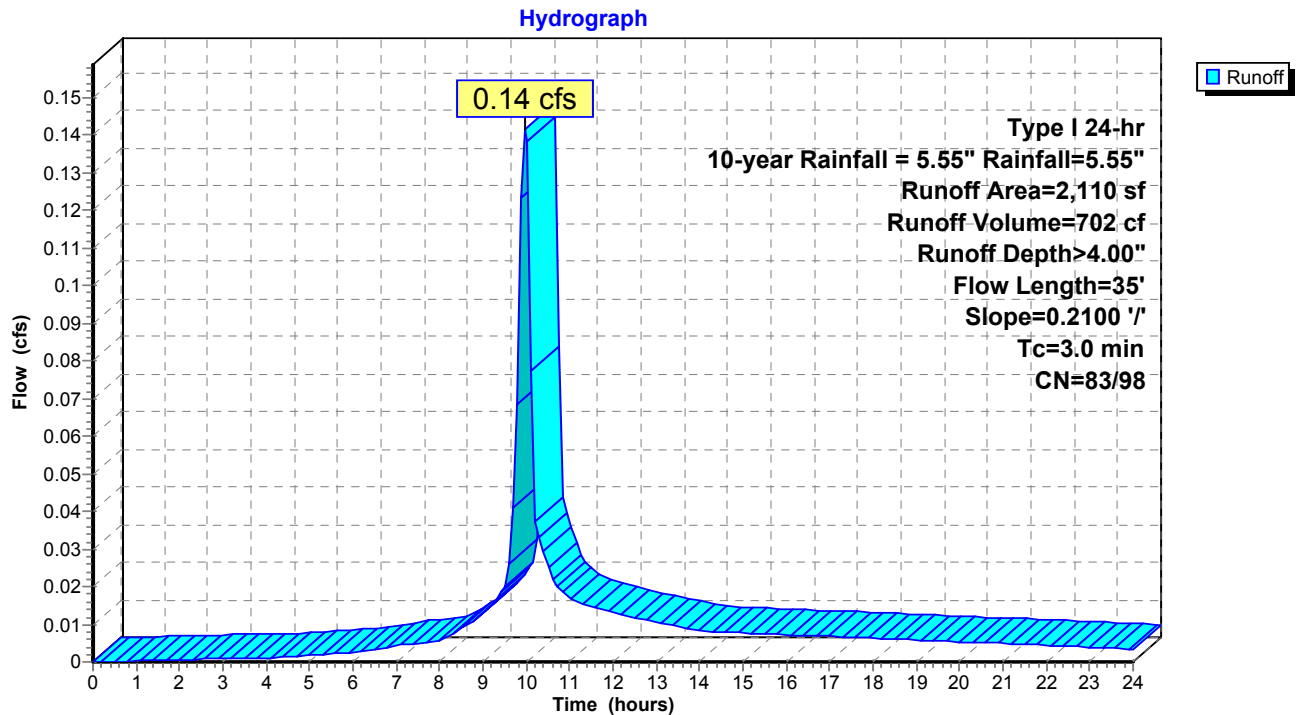
Runoff = 0.14 cfs @ 9.97 hrs, Volume= 702 cf, Depth> 4.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.7	35	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-21: Beach area



Summary for Subcatchment SC-7: Carport Driveway, East Side Yard, Upper MTLS Buttress

[49] Hint: Tc<2dt may require smaller dt

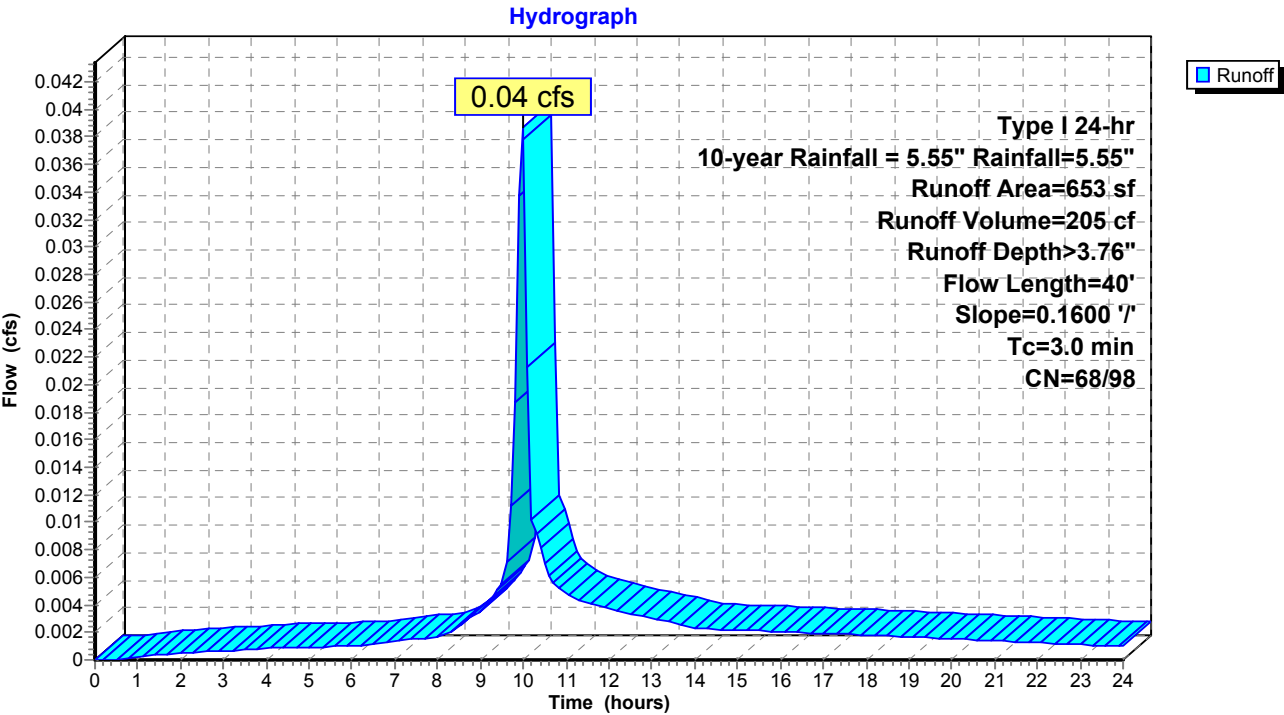
Runoff = 0.04 cfs @ 9.97 hrs, Volume= 205 cf, Depth> 3.76"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
* 320	98	Impervious
333	68	<50% Grass cover, Poor, HSG A
653	83	Weighted Average
333	68	51.00% Pervious Area
320	98	49.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	40	0.1600	2.05		Sheet Flow, n= 0.015 P2= 3.20"
0.3	40	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-7: Carport Driveway, East Side Yard, Upper MTLS Buttress



Summary for Subcatchment SC-8: MTL5 Buttress

[49] Hint: $T_c < 2dt$ may require smaller dt

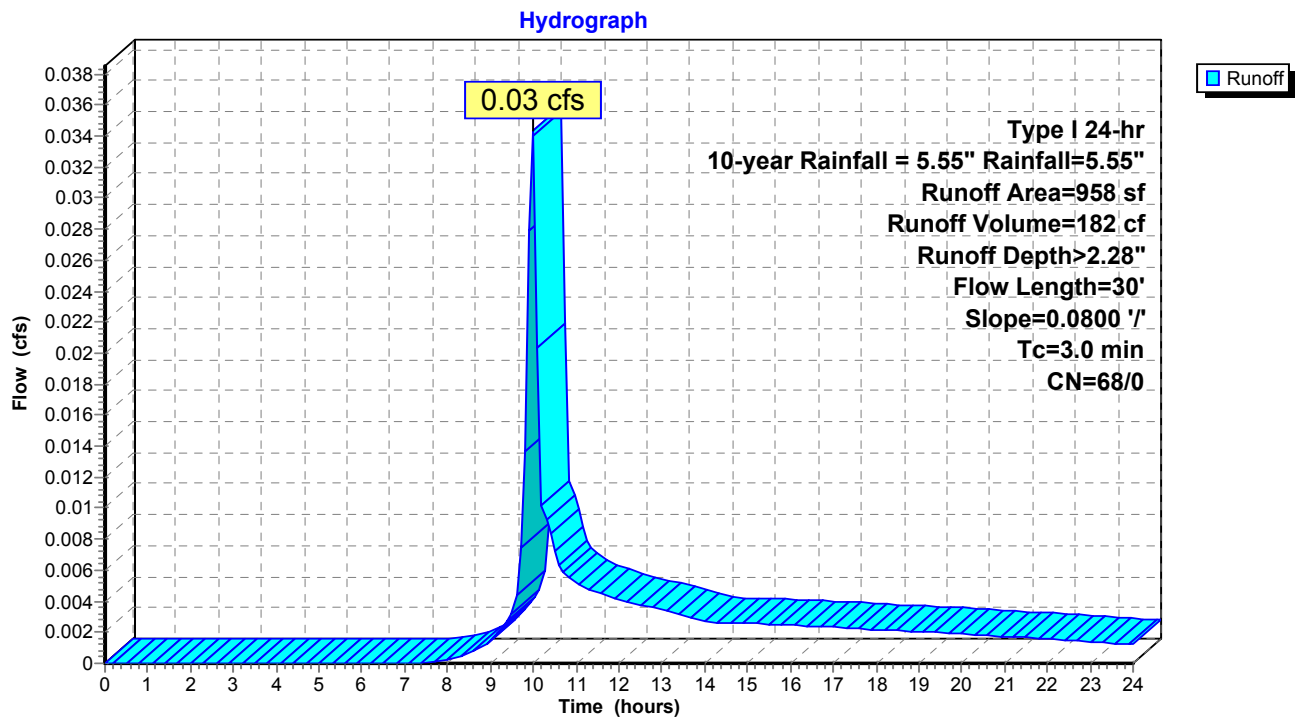
Runoff = 0.03 cfs @ 9.98 hrs, Volume= 182 cf, Depth> 2.28"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
958	68	<50% Grass cover, Poor, HSG A
958	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0800	1.47		Sheet Flow, n= 0.015 P2= 3.20"
0.3	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-8: MTL5 Buttress



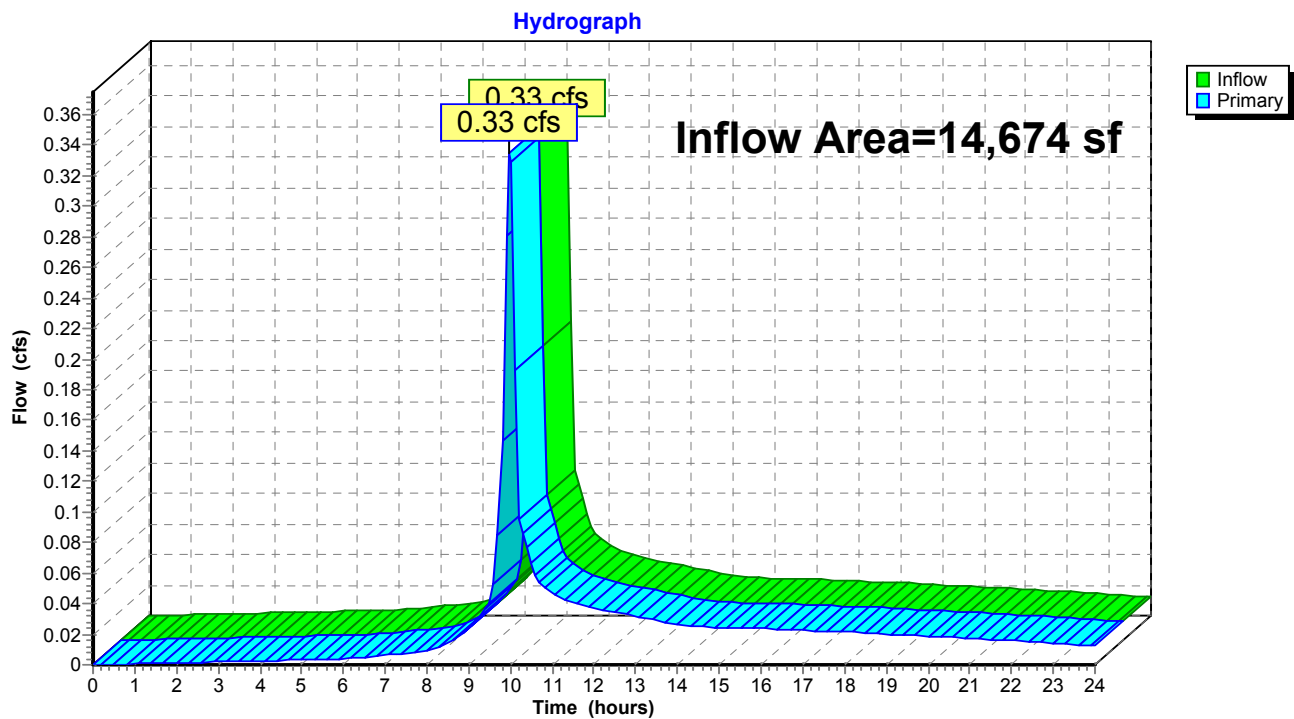
Summary for Pond WST B: Hypothetical Water Storage Tank B

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 14,674 sf, 6.11% Impervious, Inflow Depth > 1.54" for 10-year Rainfall = 5.55" event
Inflow = 0.33 cfs @ 9.98 hrs, Volume= 1,885 cf
Primary = 0.33 cfs @ 9.98 hrs, Volume= 1,885 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Pond WST B: Hypothetical Water Storage Tank B



Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: House Entry Pavement, Runoff Area=465 sf 34.41% Impervious Runoff Depth>4.31"
Flow Length=78' Slope=0.4300 '/' Tc=3.0 min CN=68/98 Runoff=0.03 cfs 167 cf

Subcatchment SC-12: MTL5 Buttress, Runoff Area=363 sf 0.00% Impervious Runoff Depth>3.17"
Flow Length=65' Slope=0.3600 '/' Tc=3.0 min CN=68/0 Runoff=0.02 cfs 96 cf

Subcatchment SC-17: LS Debris, Ex/Borrow Runoff Area=1,516 sf 0.00% Impervious Runoff Depth>3.17"
Flow Length=50' Slope=0.2400 '/' Tc=3.0 min CN=68/0 Runoff=0.08 cfs 401 cf

Subcatchment SC-18: LS Debris, Ex/Borrow Runoff Area=590 sf 0.00% Impervious Runoff Depth>3.17"
Flow Length=25' Slope=0.2400 '/' Tc=3.0 min CN=68/0 Runoff=0.03 cfs 156 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth>0.41"
Flow Length=130' Slope=0.2300 '/' Tc=3.0 min CN=35/0 Runoff=0.01 cfs 220 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>1.34"
Flow Length=35' Slope=1.0000 '/' Tc=3.0 min CN=48/0 Runoff=0.02 cfs 185 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>5.09"
Flow Length=35' Slope=0.2100 '/' Tc=3.0 min CN=83/98 Runoff=0.18 cfs 895 cf

Subcatchment SC-7: Carport Driveway, East Runoff Area=653 sf 49.00% Impervious Runoff Depth>4.79"
Flow Length=40' Slope=0.1600 '/' Tc=3.0 min CN=68/98 Runoff=0.05 cfs 261 cf

Subcatchment SC-8: MTL5 Buttress Runoff Area=958 sf 0.00% Impervious Runoff Depth>3.17"
Flow Length=30' Slope=0.0800 '/' Tc=3.0 min CN=68/0 Runoff=0.05 cfs 253 cf

Pond WST B: Hypothetical Water Storage Tank B

Inflow=0.46 cfs 2,634 cf
Primary=0.46 cfs 2,634 cf

Total Runoff Area = 14,674 sf Runoff Volume = 2,634 cf Average Runoff Depth = 2.15"
93.89% Pervious = 13,778 sf 6.11% Impervious = 896 sf

Summary for Subcatchment SC-11: House Entry Pavement, MTL5 Buttress, Ex/Borrow Area

[49] Hint: Tc<2dt may require smaller dt

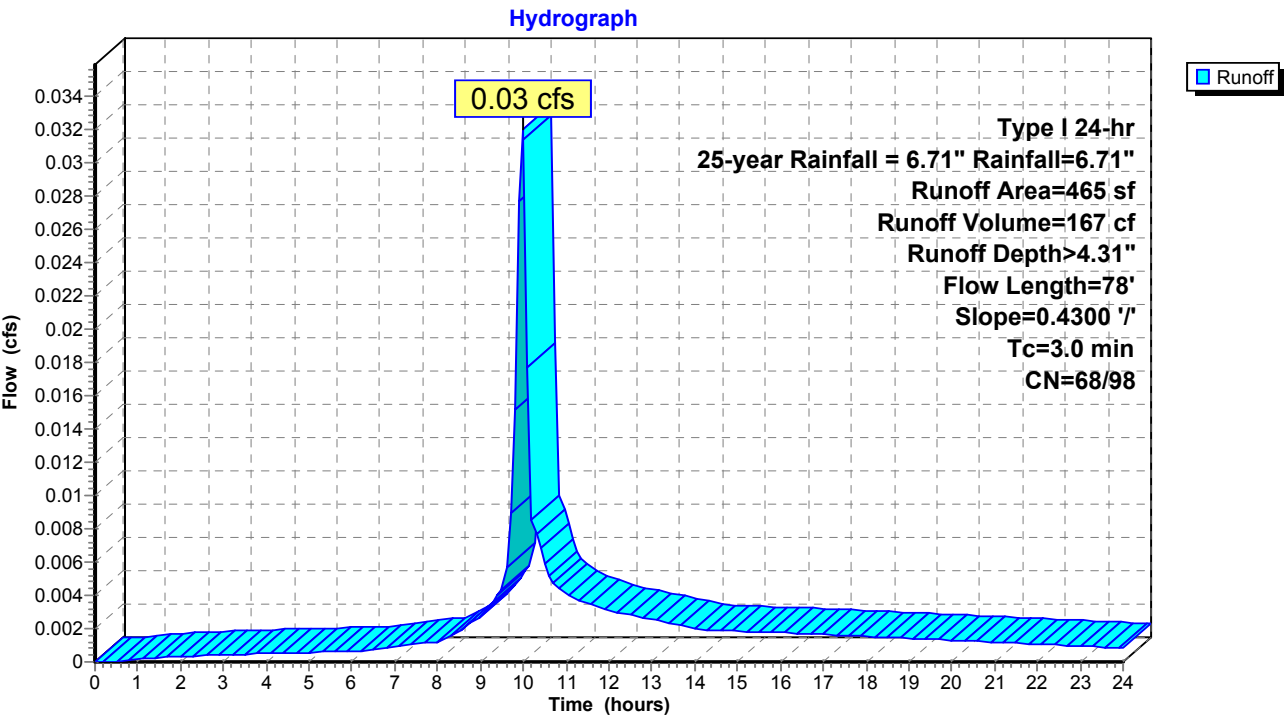
Runoff = 0.03 cfs @ 9.97 hrs, Volume= 167 cf, Depth> 4.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
305	68	<50% Grass cover, Poor, HSG A
160	98	Unconnected pavement, HSG A
465	78	Weighted Average
305	68	65.59% Pervious Area
160	98	34.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-11: House Entry Pavement, MTL5 Buttress, Ex/Borrow Area



Summary for Subcatchment SC-12: MTLs Buttress, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

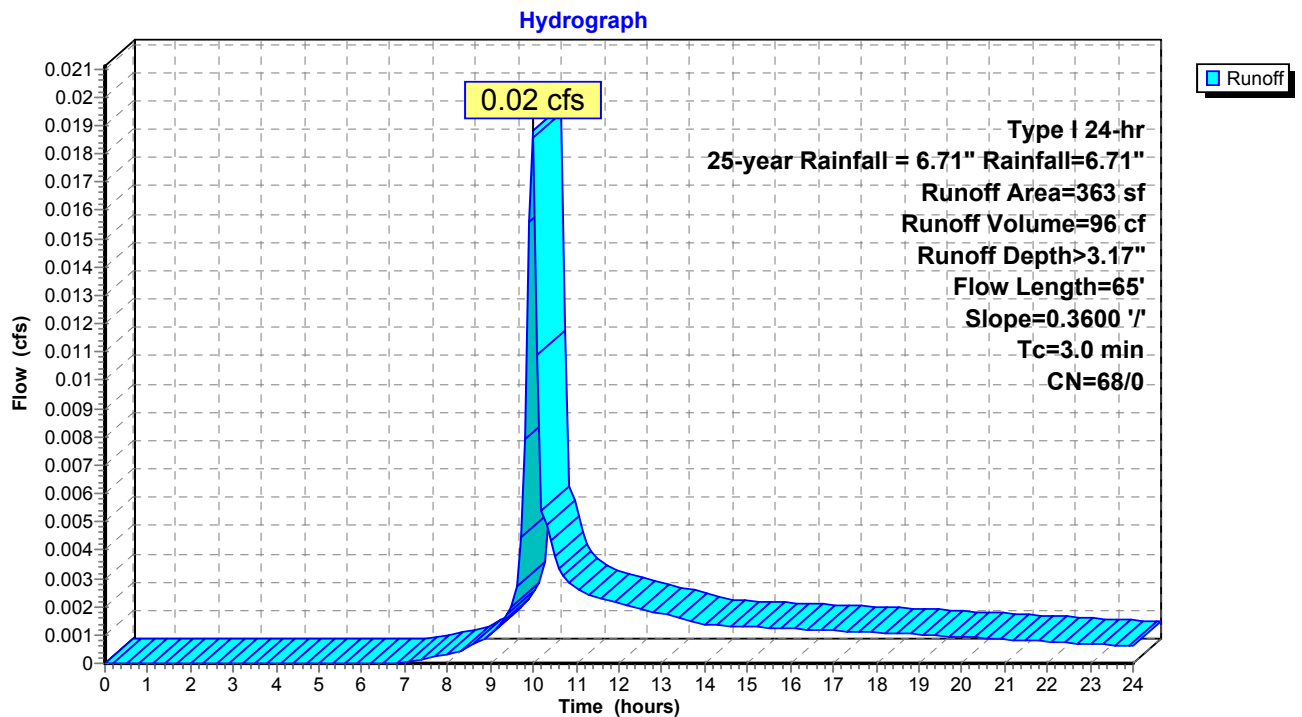
Runoff = 0.02 cfs @ 9.98 hrs, Volume= 96 cf, Depth> 3.17"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
363	68	<50% Grass cover, Poor, HSG A
363	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	65	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-12: MTLs Buttress, Ex/Borrow Area



Summary for Subcatchment SC-17: LS Debris, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

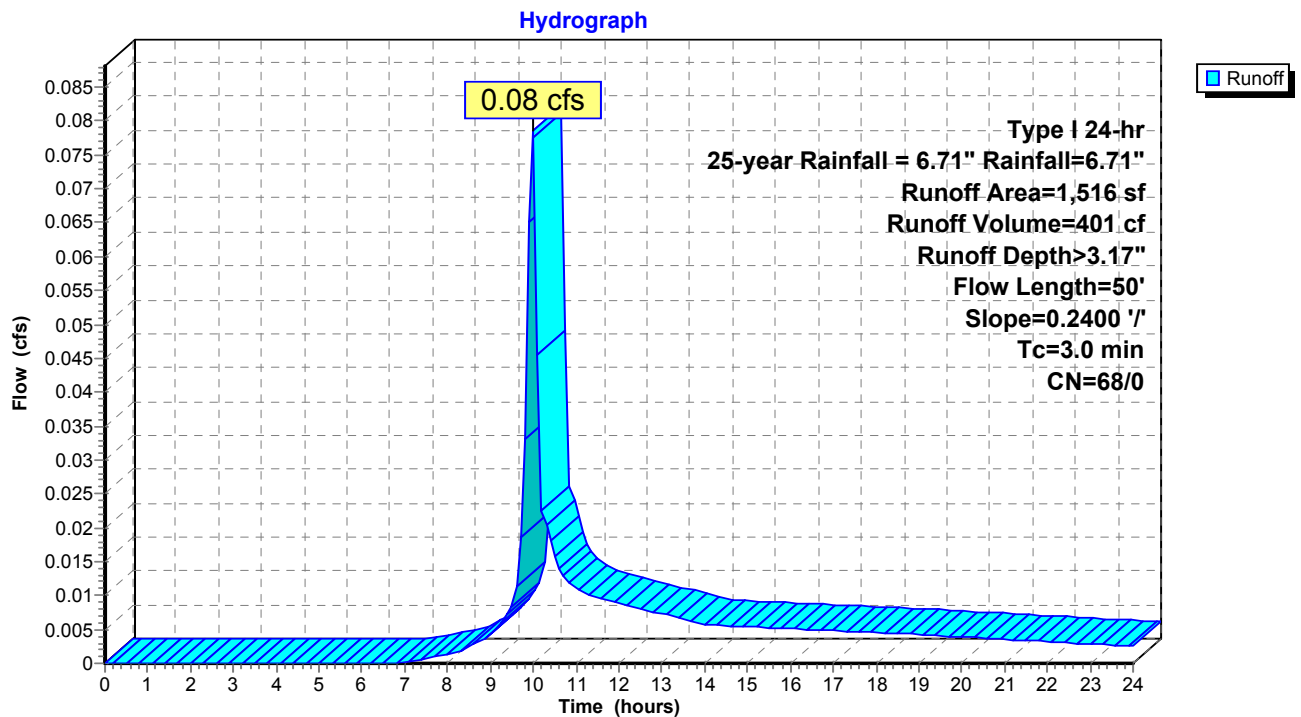
Runoff = 0.08 cfs @ 9.98 hrs, Volume= 401 cf, Depth> 3.17"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,516	68	<50% Grass cover, Poor, HSG A
1,516	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-17: LS Debris, Ex/Borrow Area



Summary for Subcatchment SC-18: LS Debris, Ex/Borrow Area

[49] Hint: $T_c < 2dt$ may require smaller dt

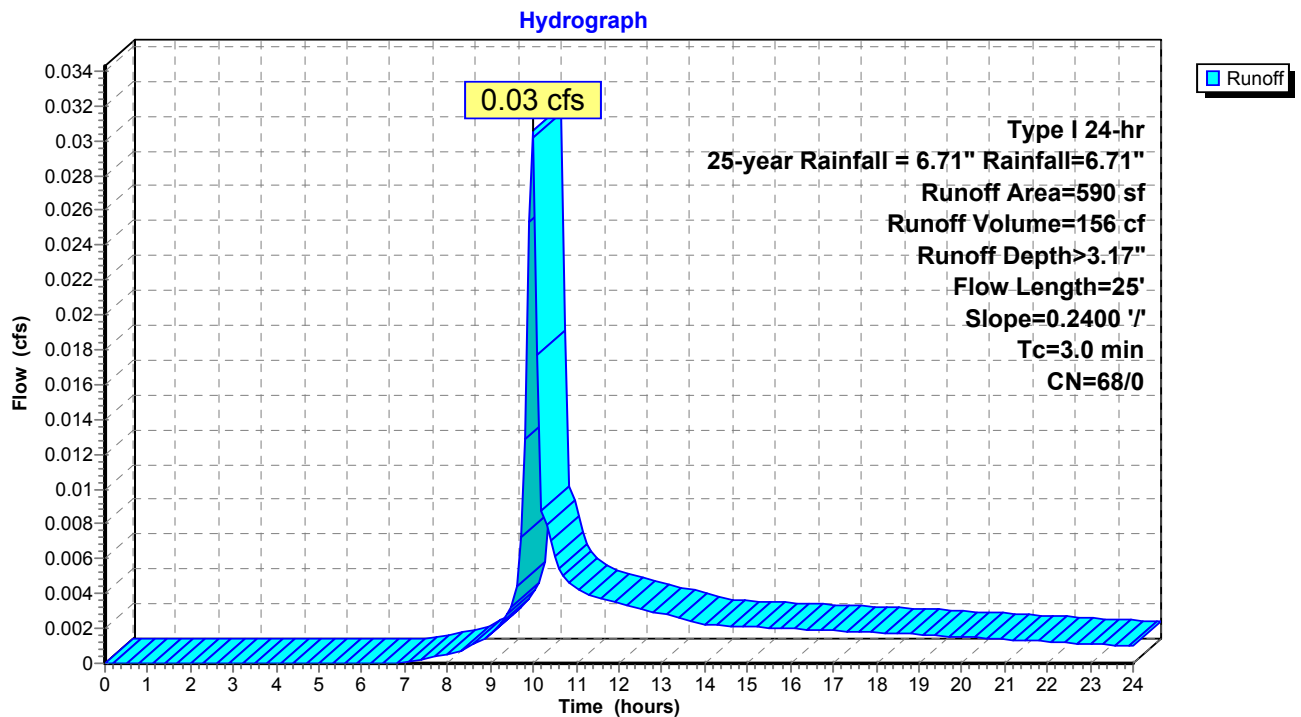
Runoff = 0.03 cfs @ 9.98 hrs, Volume= 156 cf, Depth> 3.17"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
590	68	<50% Grass cover, Poor, HSG A
590	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-18: LS Debris, Ex/Borrow Area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

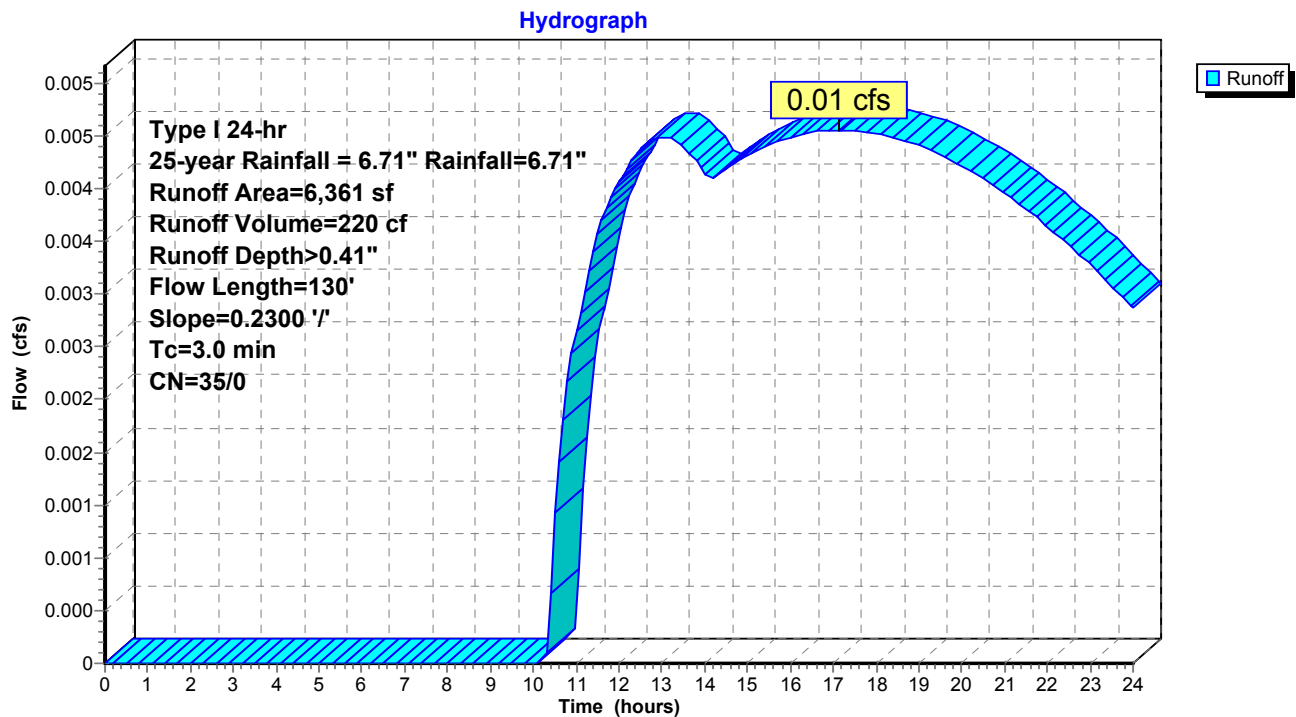
Runoff = 0.01 cfs @ 17.16 hrs, Volume= 220 cf, Depth> 0.41"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

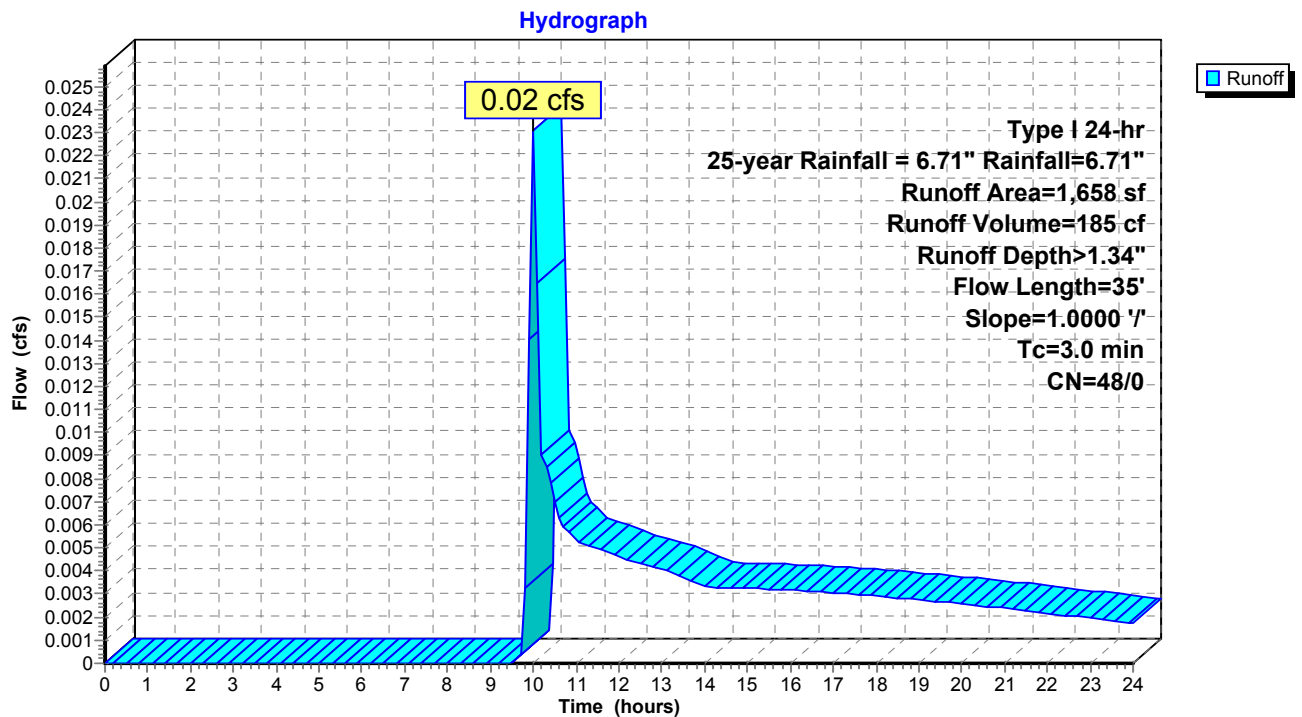
Runoff = 0.02 cfs @ 10.01 hrs, Volume= 185 cf, Depth> 1.34"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

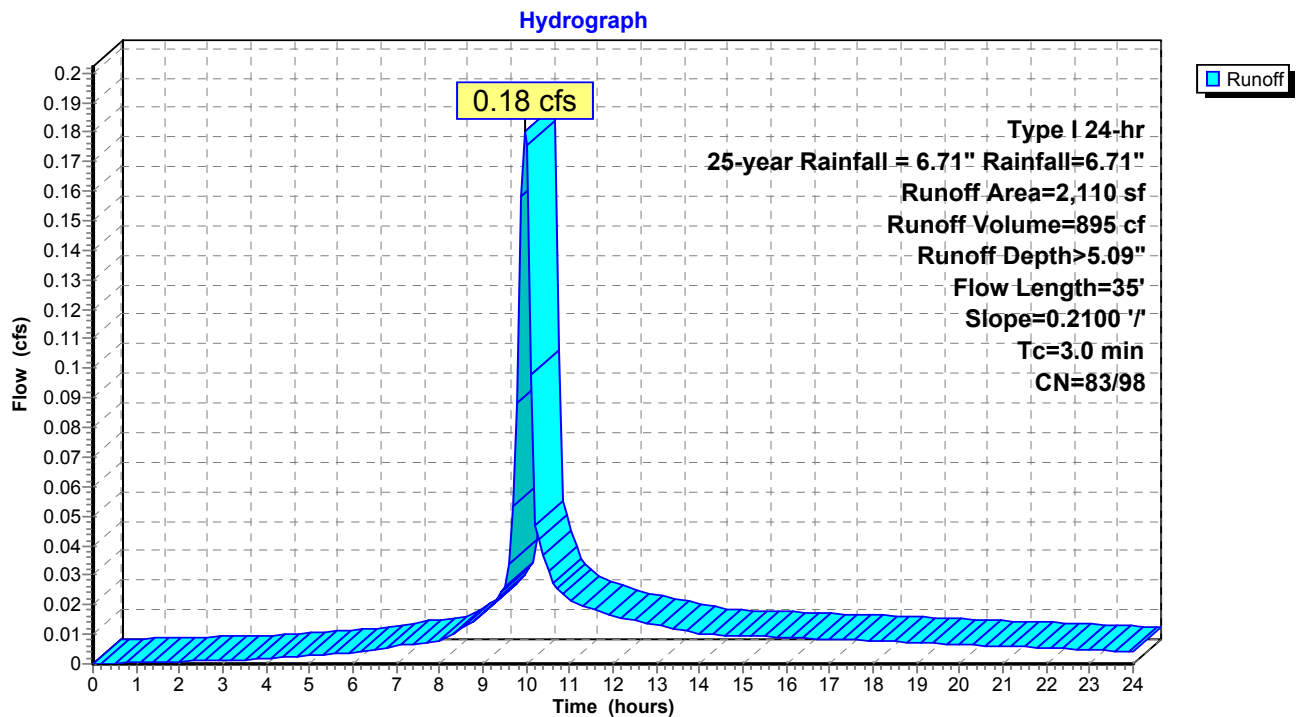
Runoff = 0.18 cfs @ 9.97 hrs, Volume= 895 cf, Depth> 5.09"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.7	35	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-21: Beach area



Summary for Subcatchment SC-7: Carport Driveway, East Side Yard, Upper MTL5 Buttress

[49] Hint: Tc<2dt may require smaller dt

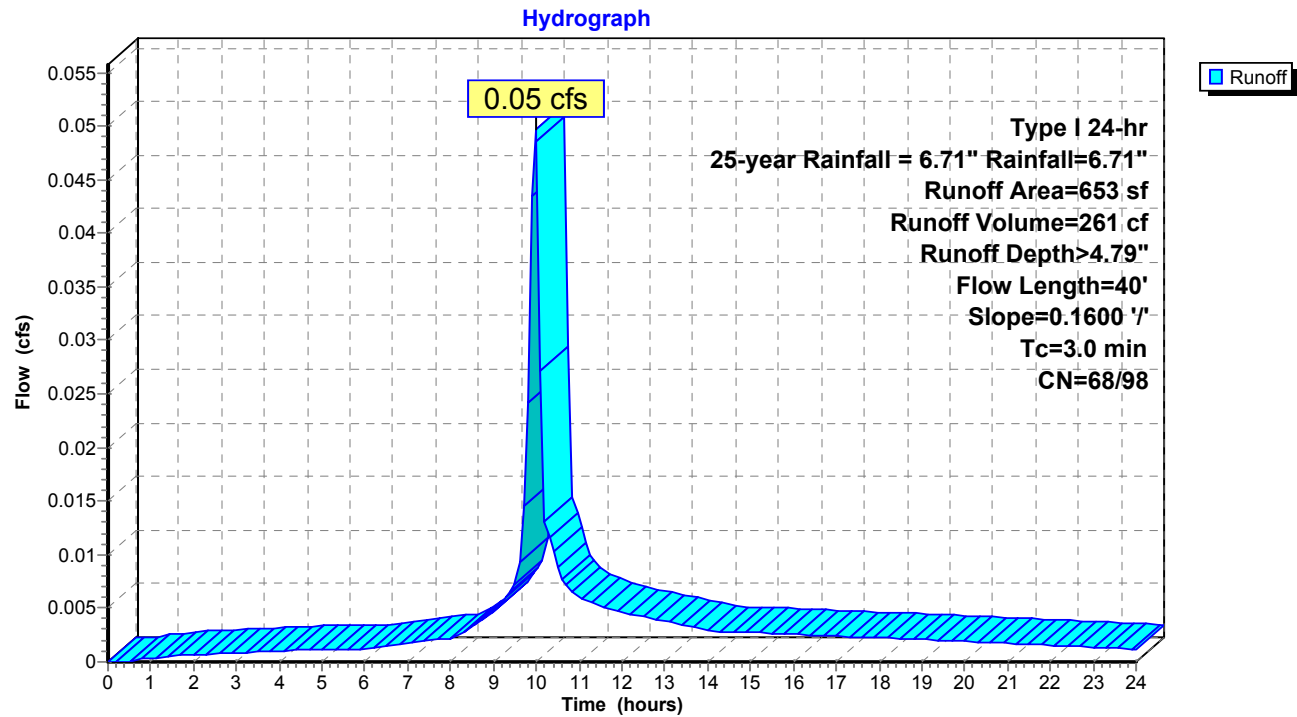
Runoff = 0.05 cfs @ 9.97 hrs, Volume= 261 cf, Depth> 4.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
* 320	98	Impervious
333	68	<50% Grass cover, Poor, HSG A
653	83	Weighted Average
333	68	51.00% Pervious Area
320	98	49.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	40	0.1600	2.05		Sheet Flow, n= 0.015 P2= 3.20"
0.3	40	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-7: Carport Driveway, East Side Yard, Upper MTL5 Buttress



Summary for Subcatchment SC-8: MTL5 Buttress

[49] Hint: $T_c < 2dt$ may require smaller dt

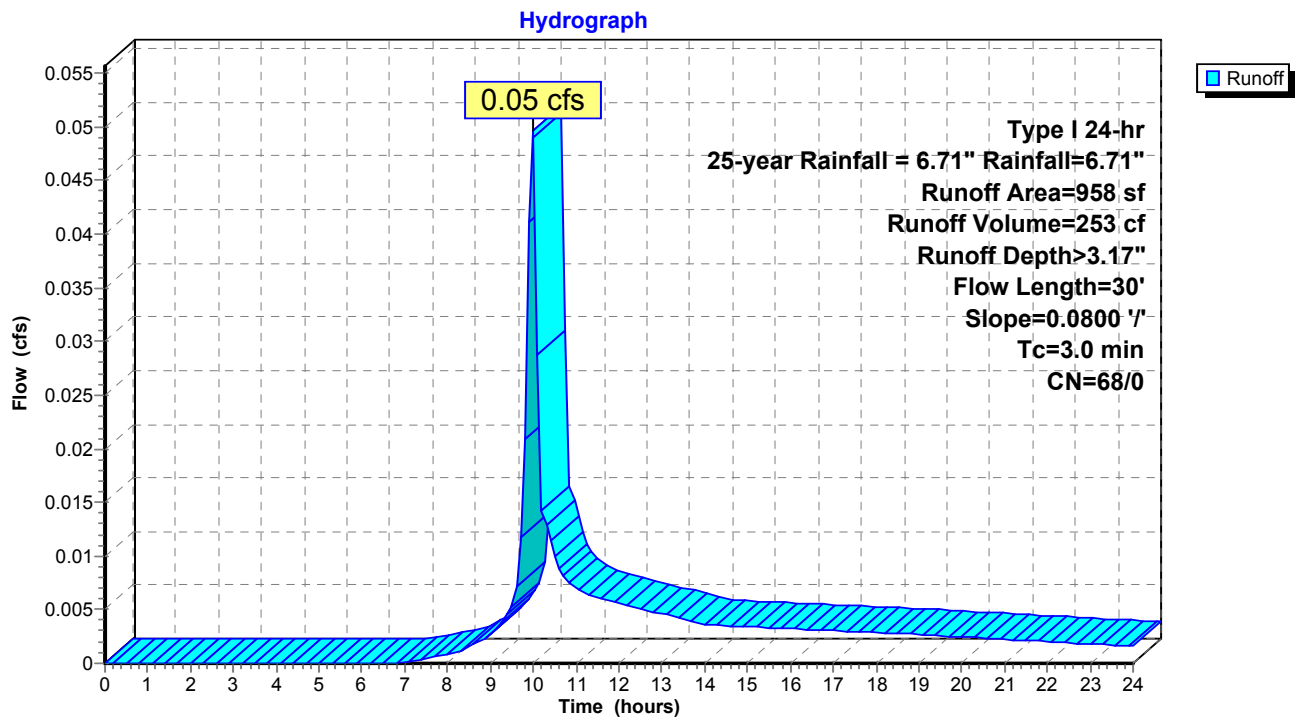
Runoff = 0.05 cfs @ 9.98 hrs, Volume= 253 cf, Depth> 3.17"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
958	68	<50% Grass cover, Poor, HSG A
958	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0800	1.47		Sheet Flow, n= 0.015 P2= 3.20"
0.3	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-8: MTL5 Buttress



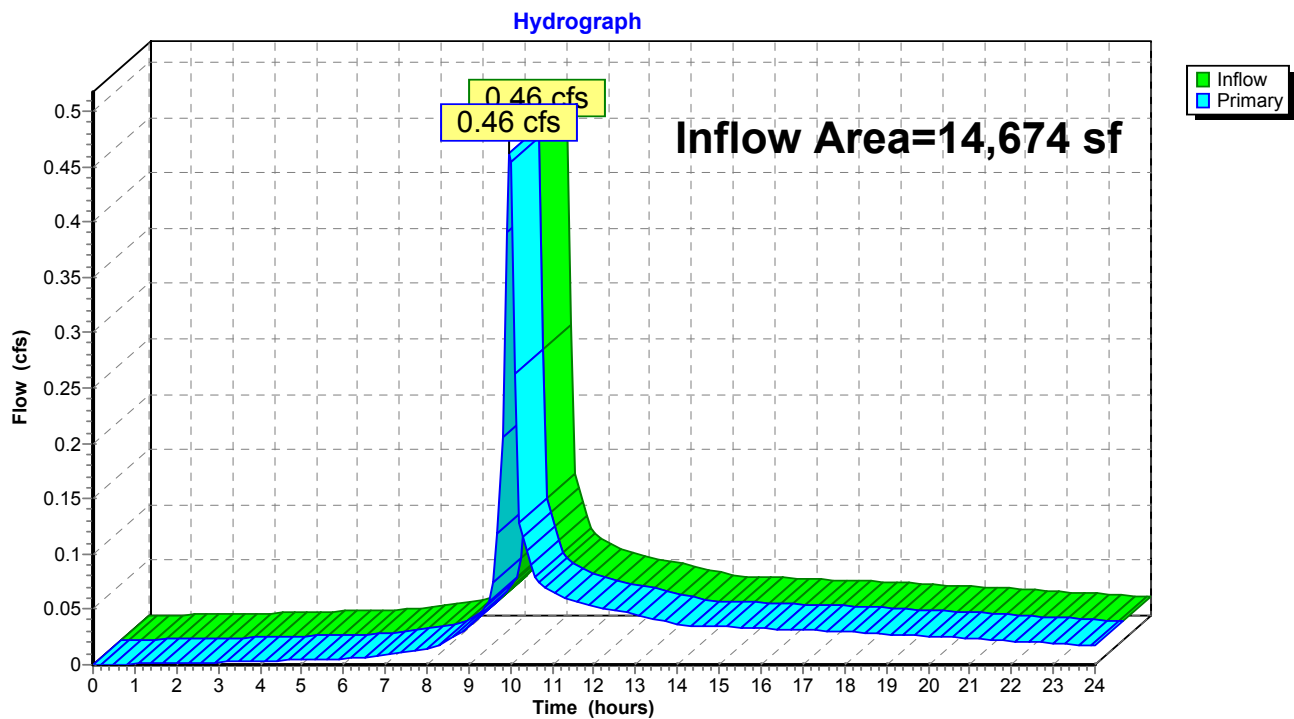
Summary for Pond WST B: Hypothetical Water Storage Tank B

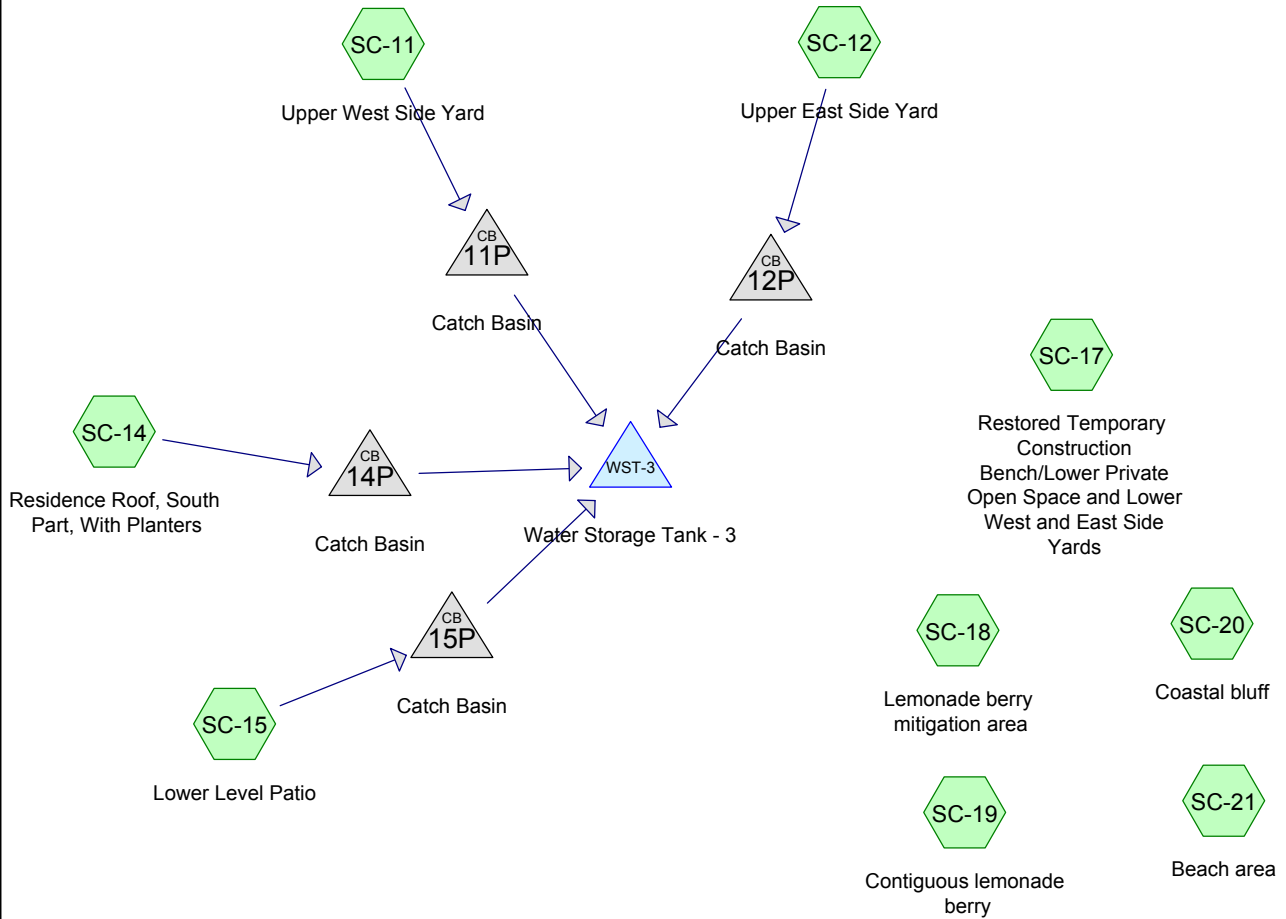
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 14,674 sf, 6.11% Impervious, Inflow Depth > 2.15" for 25-year Rainfall = 6.71" event
Inflow = 0.46 cfs @ 9.97 hrs, Volume= 2,634 cf
Primary = 0.46 cfs @ 9.97 hrs, Volume= 2,634 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Pond WST B: Hypothetical Water Storage Tank B





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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
1,779	68	<50% Grass cover, Poor, HSG A (SC-11, SC-12, SC-17)
6,892	35	Brush, Fair, HSG A (SC-18, SC-19)
1,658	48	Brush, Poor, HSG A (SC-20)
1,694	83	Brush, Poor, HSG D (SC-21)
945	98	Roofs, HSG A (SC-14)
1,085	98	Unconnected pavement, HSG A (SC-11, SC-12, SC-15, SC-17, SC-18)
416	98	Unconnected pavement, HSG D (SC-21)
14,469	57	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
12,359	HSG A	SC-11, SC-12, SC-14, SC-15, SC-17, SC-18, SC-19, SC-20
0	HSG B	
0	HSG C	
2,110	HSG D	SC-21
0	Other	
14,469		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subo Num
1,779	0	0	0	0	1,779	<50% Grass cover, Poor	
6,892	0	0	0	0	6,892	Brush, Fair	
1,658	0	0	1,694	0	3,352	Brush, Poor	
945	0	0	0	0	945	Roofs	
1,085	0	0	416	0	1,501	Unconnected pavement	
12,359	0	0	2,110	0	14,469	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	11P	95.50	95.00	31.0	0.0161	0.010	4.0	0.0	0.0
2	12P	95.50	95.00	35.0	0.0143	0.010	4.0	0.0	0.0
3	14P	96.00	95.00	5.0	0.2000	0.010	4.0	0.0	0.0
4	15P	95.50	95.00	5.0	0.1000	0.010	4.0	0.0	0.0
5	WST-3	94.50	93.50	10.0	0.1000	0.010	6.0	0.0	0.0

1925 ECDLL_Current Conditions Analysis_Lower_2015-06-Type I 24-hr 1" Rainfall=1.00"

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: Upper West Side Yard Runoff Area=465 sf 50.11% Impervious Runoff Depth>0.40"
Flow Length=78' Slope=0.4300 '/ Tc=3.0 min CN=68/98 Runoff=0.00 cfs 15 cf

Subcatchment SC-12: Upper East Side Yard Runoff Area=363 sf 49.86% Impervious Runoff Depth>0.39"
Flow Length=65' Slope=0.3600 '/ Tc=3.0 min CN=68/98 Runoff=0.00 cfs 12 cf

Subcatchment SC-14: Residence Roof, Runoff Area=945 sf 100.00% Impervious Runoff Depth>0.79"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.01 cfs 62 cf

Subcatchment SC-15: Lower Level Patio Runoff Area=461 sf 100.00% Impervious Runoff Depth>0.79"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.01 cfs 30 cf

Subcatchment SC-17: Restored Temporary Runoff Area=1,516 sf 9.96% Impervious Runoff Depth>0.08"
Flow Length=50' Slope=0.2400 '/ Tc=3.0 min CN=68/98 Runoff=0.00 cfs 10 cf

Subcatchment SC-18: Lemonade berry Runoff Area=590 sf 10.00% Impervious Runoff Depth>0.08"
Flow Length=25' Slope=0.2400 '/ Tc=3.0 min CN=35/98 Runoff=0.00 cfs 4 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=130' Slope=0.2300 '/ Tc=3.0 min CN=35/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=35' Slope=1.0000 '/ Tc=3.0 min CN=48/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>0.26"
Flow Length=35' Slope=0.2100 '/ Tc=3.0 min CN=83/98 Runoff=0.01 cfs 46 cf

Pond 11P: Catch Basin Peak Elev=95.54' Inflow=0.00 cfs 15 cf
4.0" Round Culvert n=0.010 L=31.0' S=0.0161 '/ Outflow=0.00 cfs 15 cf

Pond 12P: Catch Basin Peak Elev=95.53' Inflow=0.00 cfs 12 cf
4.0" Round Culvert n=0.010 L=35.0' S=0.0143 '/ Outflow=0.00 cfs 12 cf

Pond 14P: Catch Basin Peak Elev=96.07' Inflow=0.01 cfs 62 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.2000 '/ Outflow=0.01 cfs 62 cf

Pond 15P: Catch Basin Peak Elev=95.55' Inflow=0.01 cfs 30 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/ Outflow=0.01 cfs 30 cf

Pond WST-3: Water Storage Tank - 3 Peak Elev=91.11' Storage=986 cf Inflow=0.03 cfs 987 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.1000 '/ Outflow=0.00 cfs 0 cf

Total Runoff Area = 14,469 sf Runoff Volume = 180 cf Average Runoff Depth = 0.15"
83.09% Pervious = 12,023 sf 16.91% Impervious = 2,446 sf

Summary for Subcatchment SC-11: Upper West Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

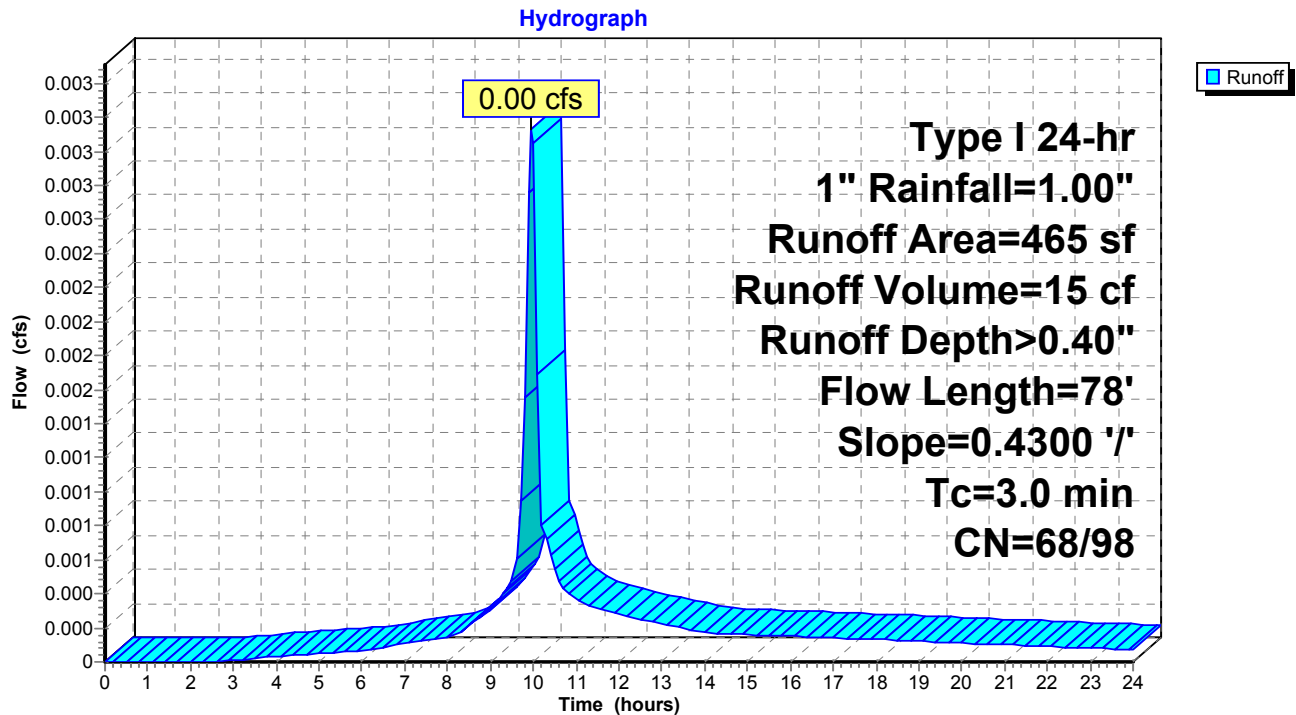
Runoff = 0.00 cfs @ 9.97 hrs, Volume= 15 cf, Depth> 0.40"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
232	68	<50% Grass cover, Poor, HSG A
233	98	Unconnected pavement, HSG A
465	83	Weighted Average
232	68	49.89% Pervious Area
233	98	50.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-11: Upper West Side Yard



Summary for Subcatchment SC-12: Upper East Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

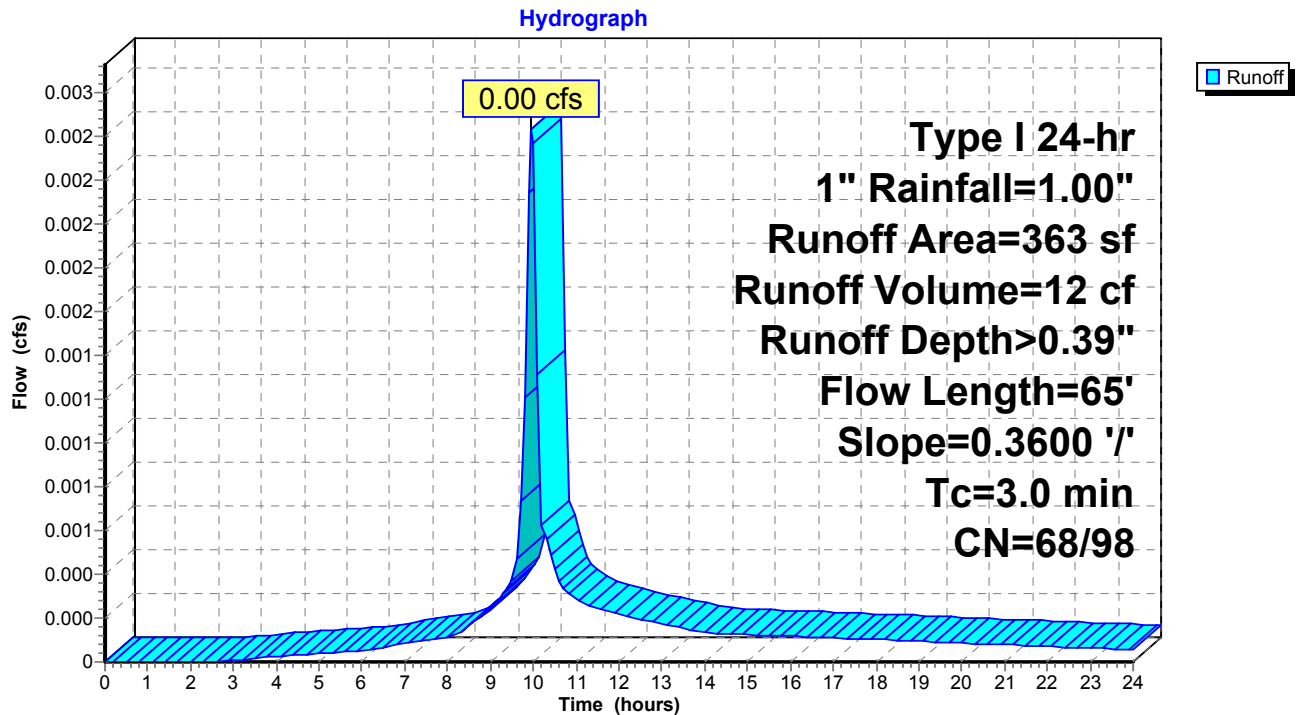
Runoff = 0.00 cfs @ 9.97 hrs, Volume= 12 cf, Depth> 0.39"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
182	68	<50% Grass cover, Poor, HSG A
181	98	Unconnected pavement, HSG A
363	83	Weighted Average
182	68	50.14% Pervious Area
181	98	49.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	65	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-12: Upper East Side Yard



Summary for Subcatchment SC-14: Residence Roof, South Part, With Planters

[49] Hint: $T_c < 2dt$ may require smaller dt

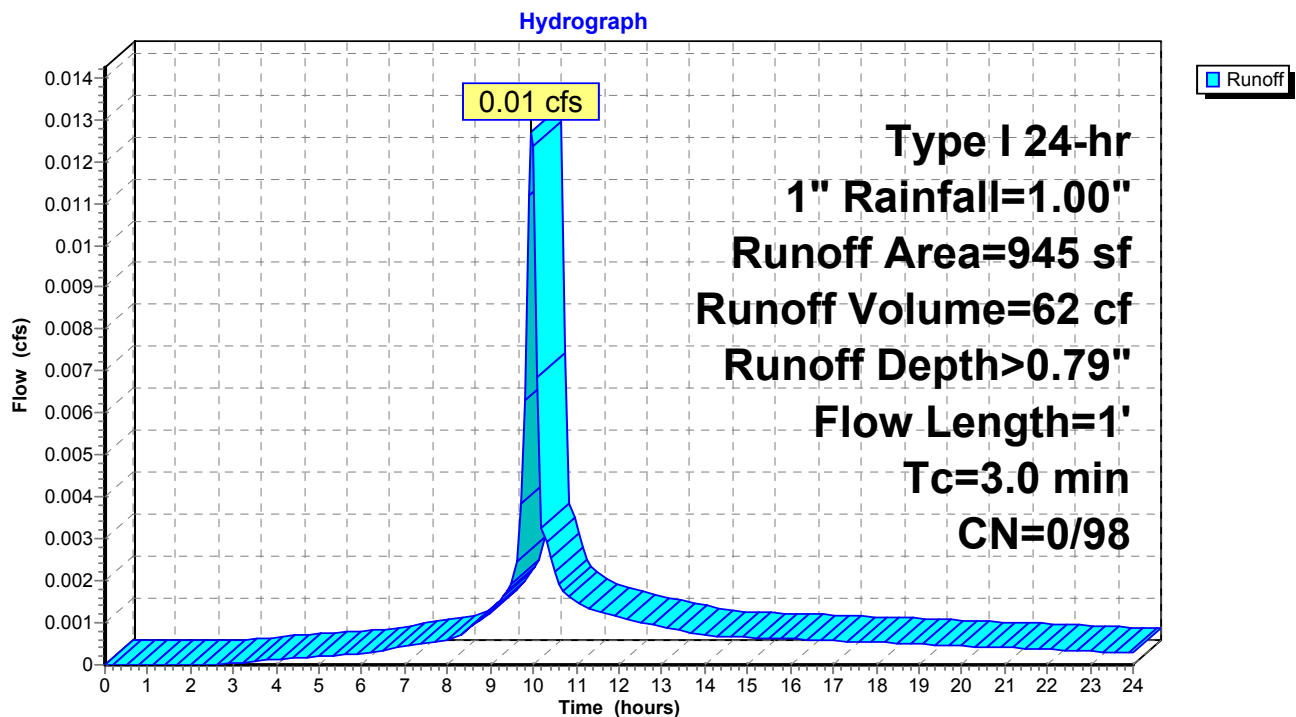
Runoff = 0.01 cfs @ 9.97 hrs, Volume= 62 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
945	98	Roofs, HSG A
945	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-14: Residence Roof, South Part, With Planters



Summary for Subcatchment SC-15: Lower Level Patio

[49] Hint: $T_c < 2dt$ may require smaller dt

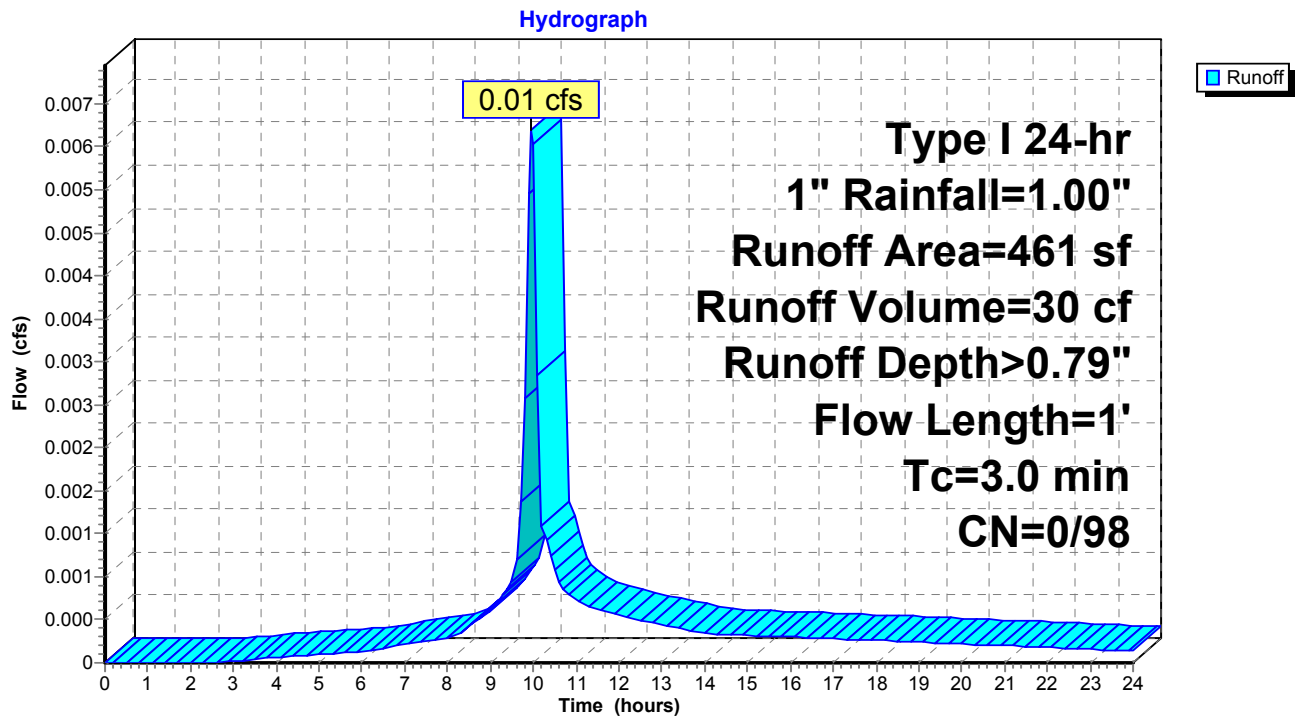
Runoff = 0.01 cfs @ 9.97 hrs, Volume= 30 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
461	98	Unconnected pavement, HSG A
461	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-15: Lower Level Patio



catchment SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West

[49] Hint: $T_c < 2dt$ may require smaller dt

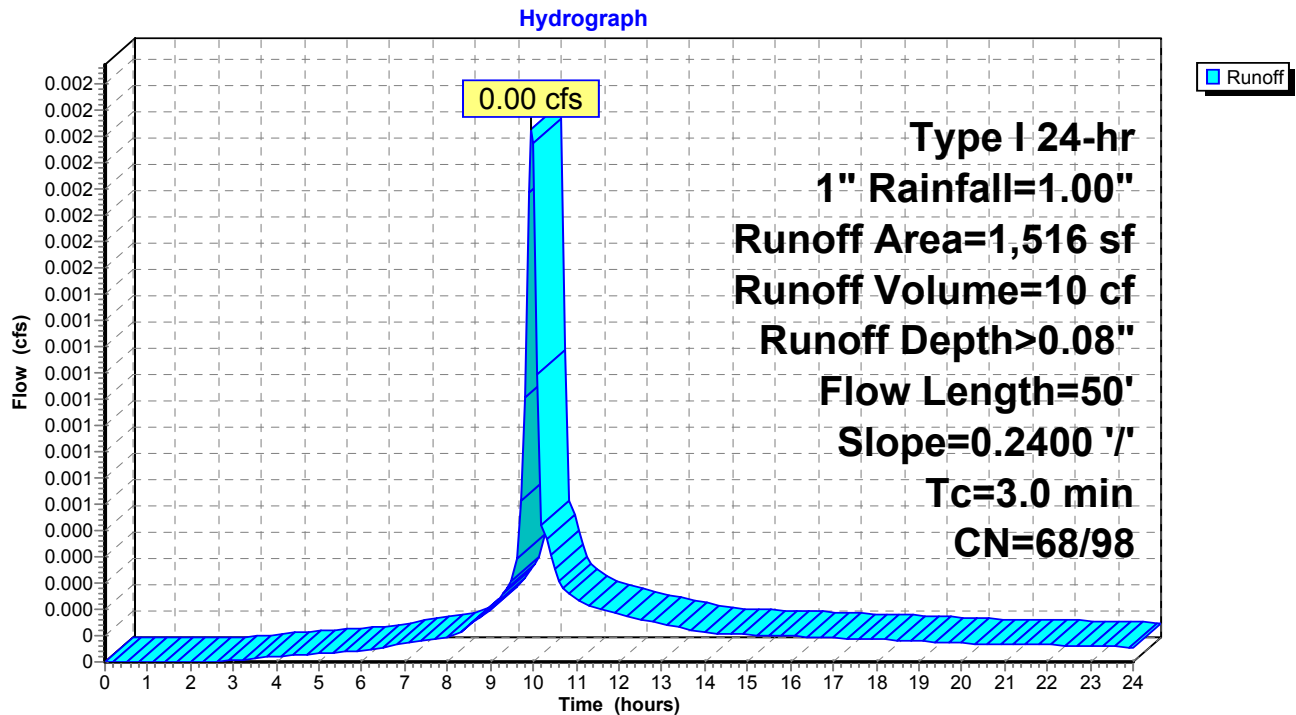
Runoff = 0.00 cfs @ 9.97 hrs, Volume= 10 cf, Depth> 0.08"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
1,365	68	<50% Grass cover, Poor, HSG A
151	98	Unconnected pavement, HSG A
1,516	71	Weighted Average
1,365	68	90.04% Pervious Area
151	98	9.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum $T_c = 3.0$ min			

ent SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West and E



Summary for Subcatchment SC-18: Lemonade berry mitigation area

[49] Hint: $T_c < 2dt$ may require smaller dt

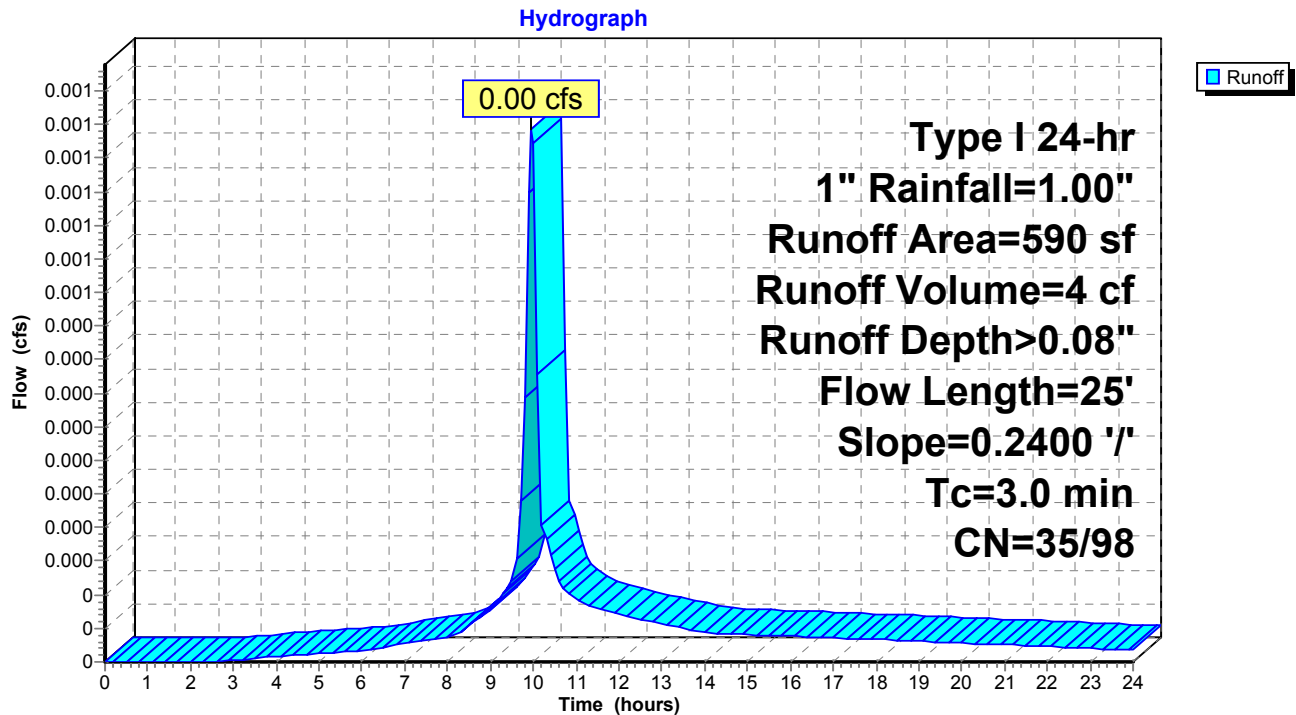
Runoff = 0.00 cfs @ 9.97 hrs, Volume= 4 cf, Depth> 0.08"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
531	35	Brush, Fair, HSG A
59	98	Unconnected pavement, HSG A
590	41	Weighted Average
531	35	90.00% Pervious Area
59	98	10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.5	25	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-18: Lemonade berry mitigation area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

[45] Hint: Runoff=Zero

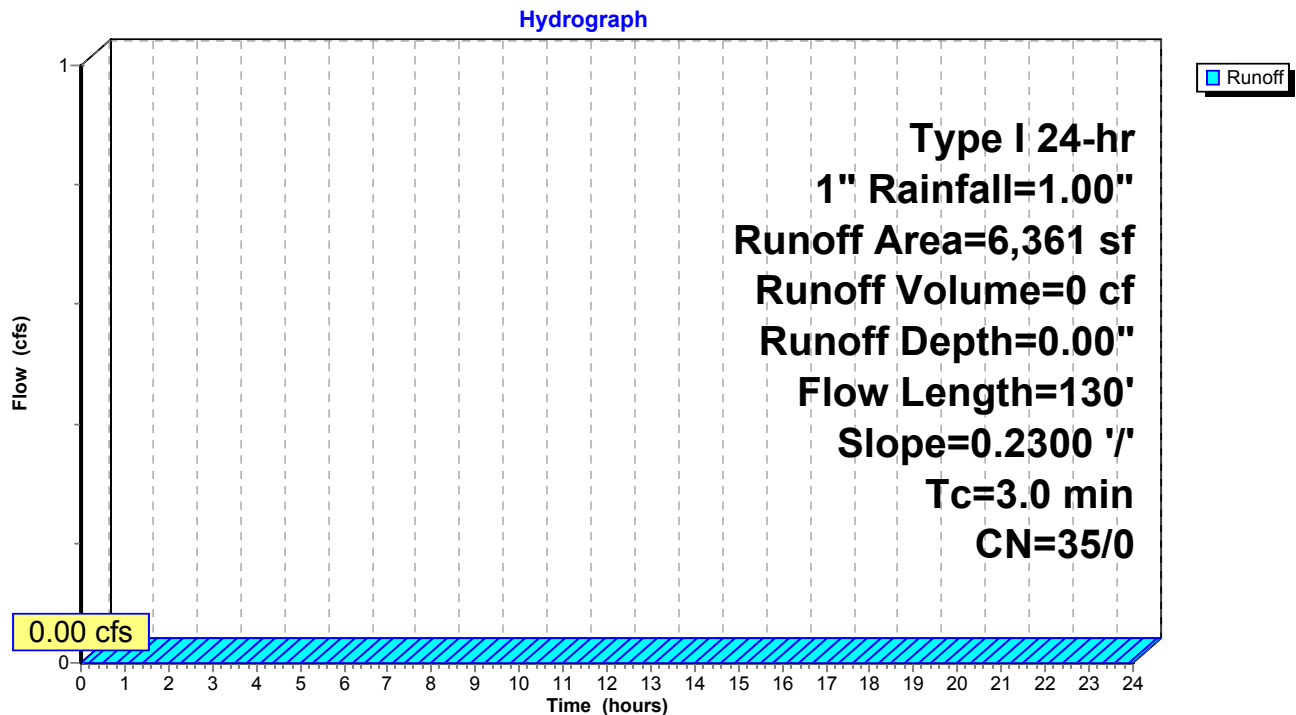
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

[45] Hint: Runoff=Zero

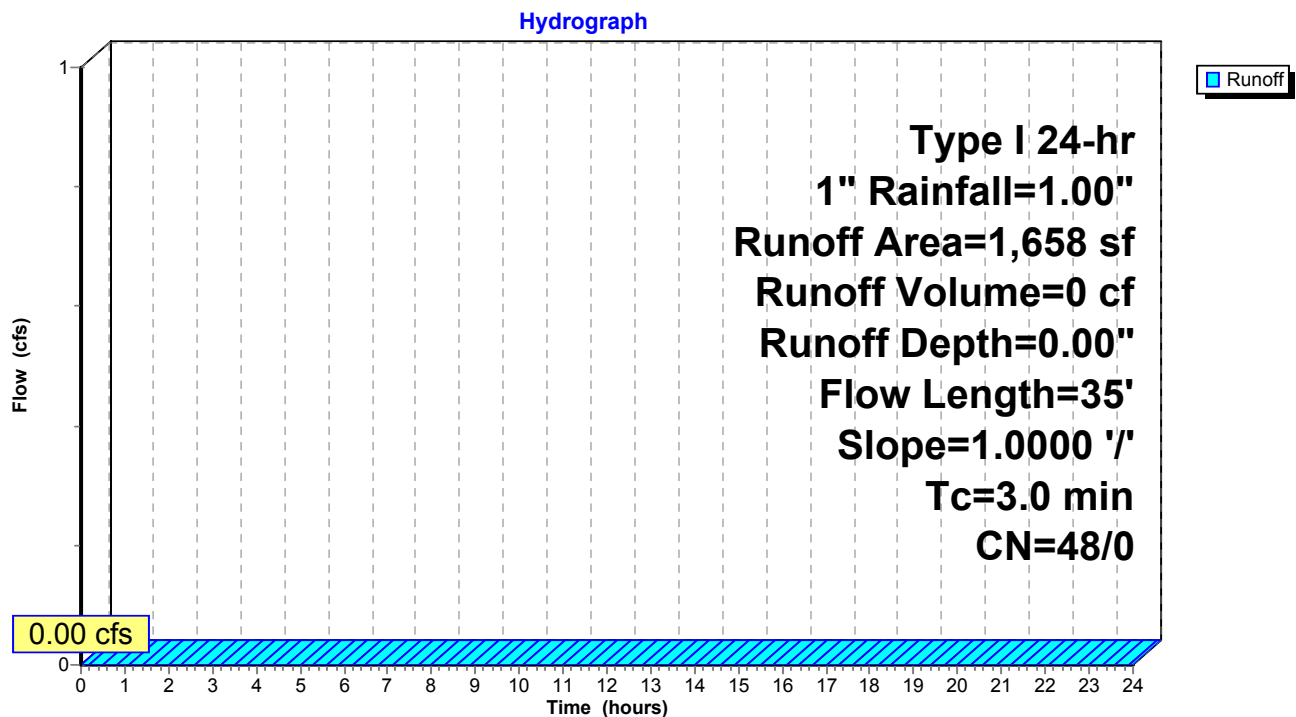
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

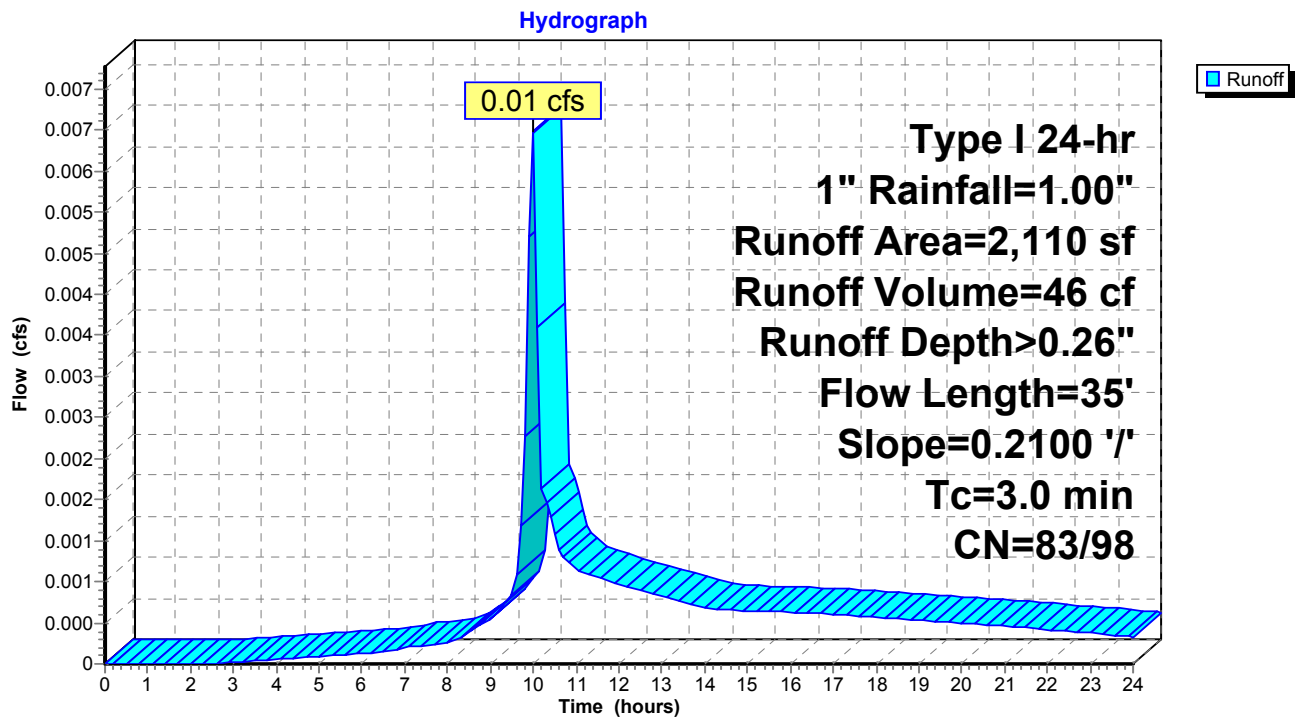
Runoff = 0.01 cfs @ 9.98 hrs, Volume= 46 cf, Depth> 0.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.7	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-21: Beach area



Summary for Pond 11P: Catch Basin

[57] Hint: Peaked at 95.54' (Flood elevation advised)

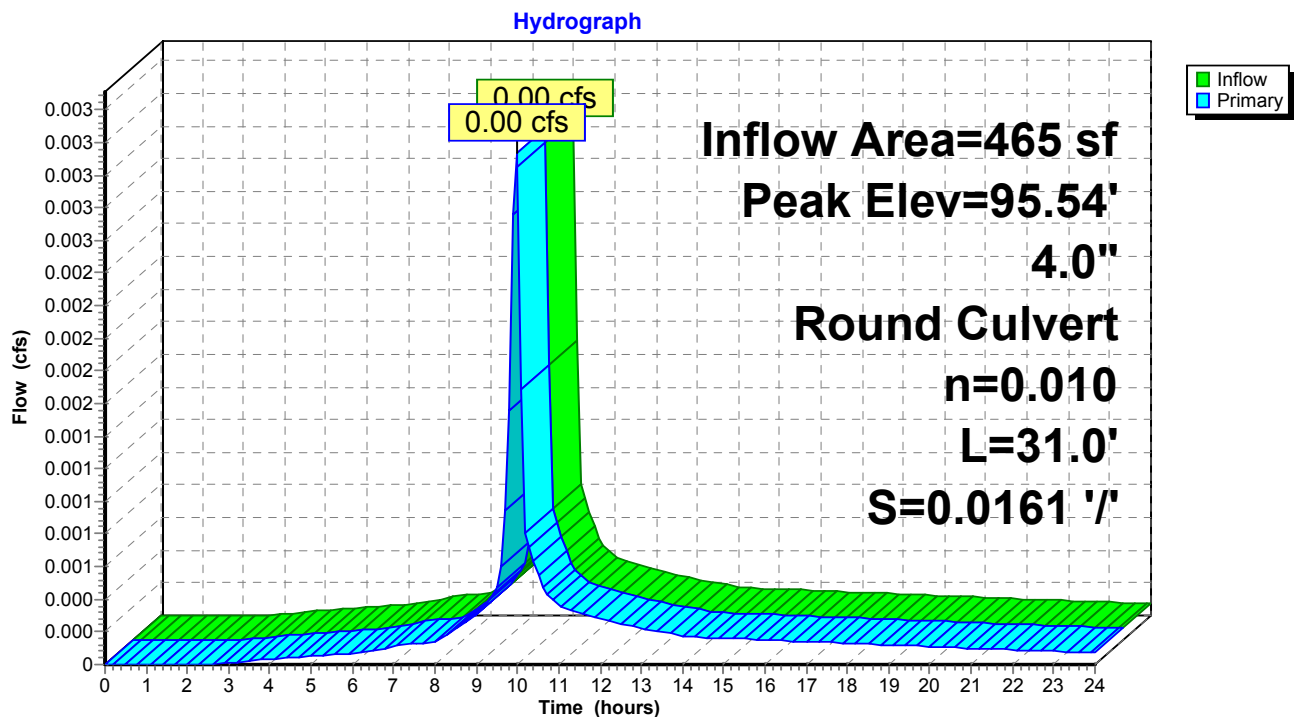
Inflow Area = 465 sf, 50.11% Impervious, Inflow Depth > 0.40" for 1" event
 Inflow = 0.00 cfs @ 9.97 hrs, Volume= 15 cf
 Outflow = 0.00 cfs @ 9.97 hrs, Volume= 15 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.00 cfs @ 9.97 hrs, Volume= 15 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.54' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0161 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.00 cfs @ 9.97 hrs HW=95.53' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.00 cfs @ 0.63 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Catch Basin

[57] Hint: Peaked at 95.53' (Flood elevation advised)

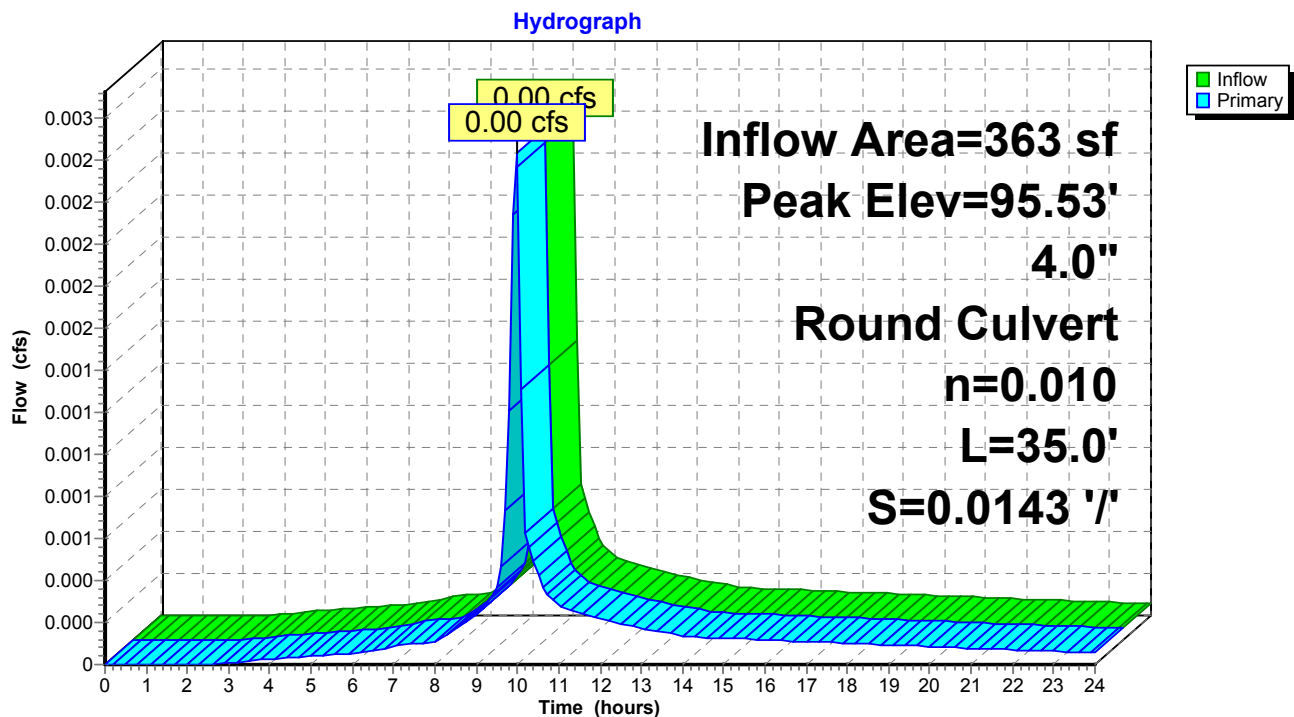
Inflow Area = 363 sf, 49.86% Impervious, Inflow Depth > 0.39" for 1" event
 Inflow = 0.00 cfs @ 9.97 hrs, Volume= 12 cf
 Outflow = 0.00 cfs @ 9.97 hrs, Volume= 12 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.00 cfs @ 9.97 hrs, Volume= 12 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.53' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0143 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.00 cfs @ 9.97 hrs HW=95.53' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.00 cfs @ 0.59 fps)

Pond 12P: Catch Basin



Summary for Pond 14P: Catch Basin

[57] Hint: Peaked at 96.07' (Flood elevation advised)

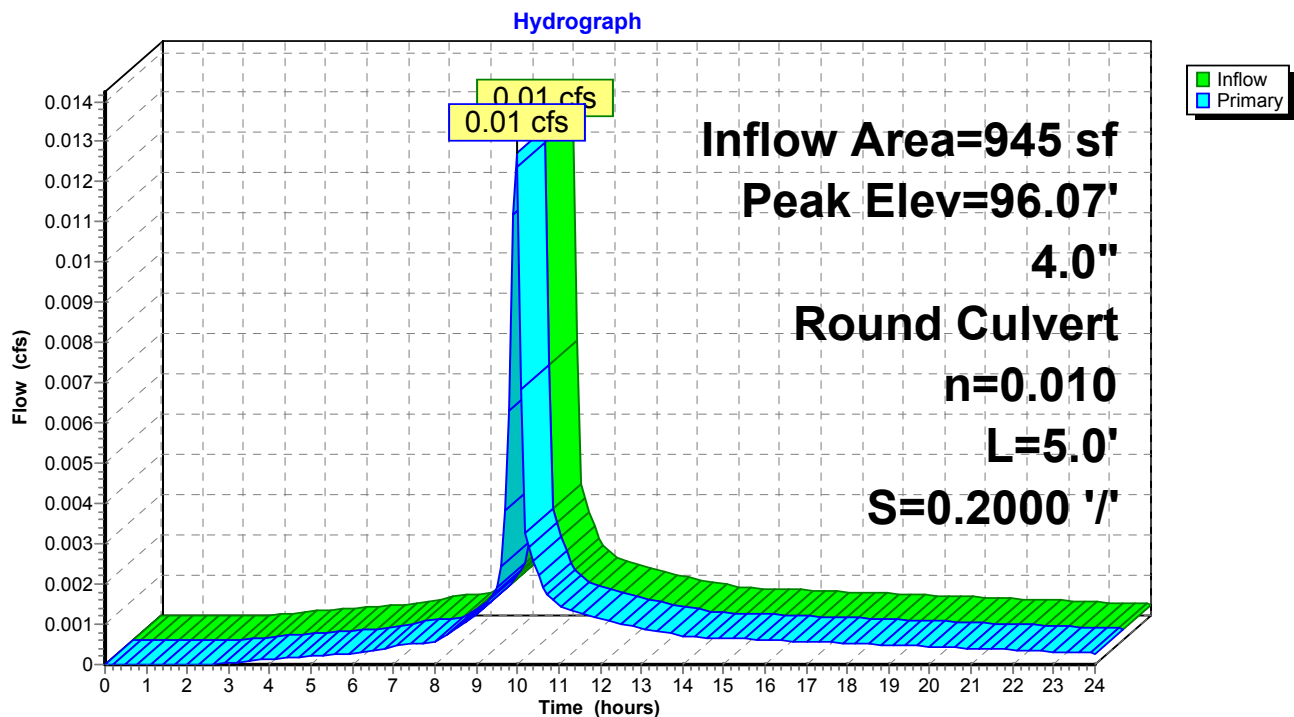
Inflow Area = 945 sf, 100.00% Impervious, Inflow Depth > 0.79" for 1" event
 Inflow = 0.01 cfs @ 9.97 hrs, Volume= 62 cf
 Outflow = 0.01 cfs @ 9.97 hrs, Volume= 62 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 9.97 hrs, Volume= 62 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 96.07' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	96.00'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.00' / 95.00' S= 0.2000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 9.97 hrs HW=96.07' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.01 cfs @ 0.90 fps)

Pond 14P: Catch Basin



Summary for Pond 15P: Catch Basin

[57] Hint: Peaked at 95.55' (Flood elevation advised)

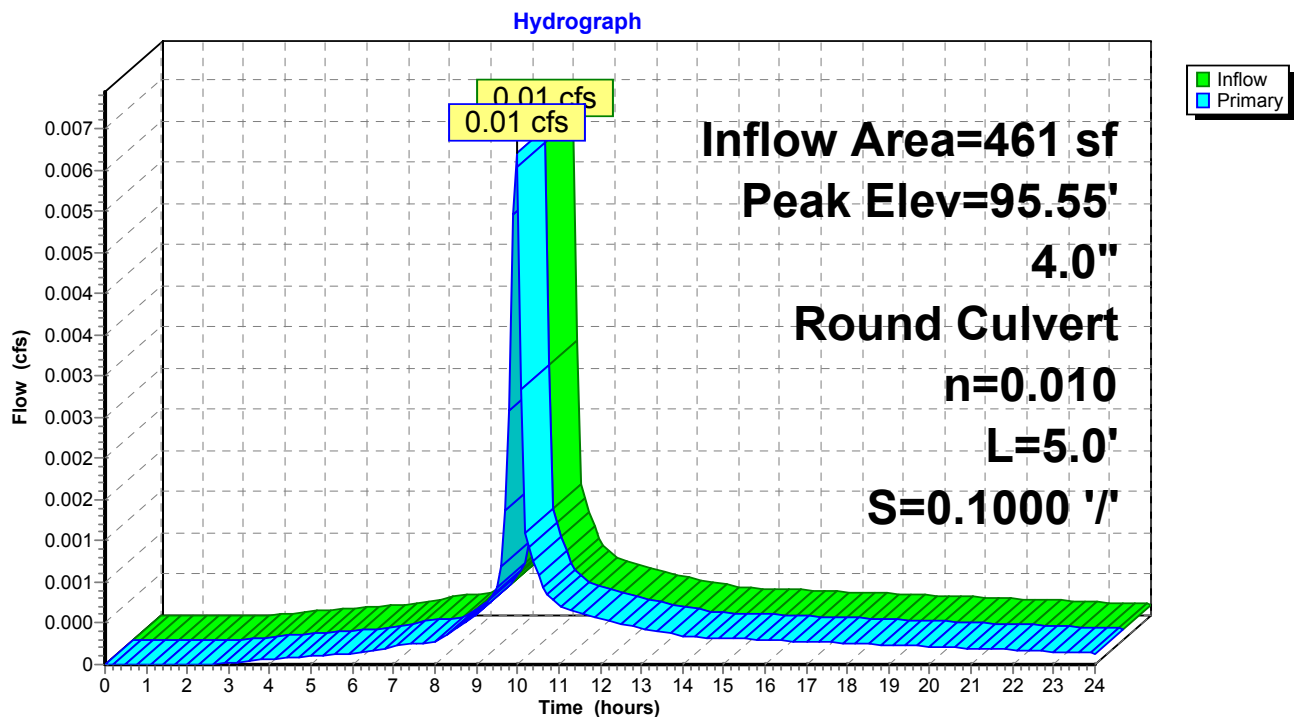
Inflow Area = 461 sf, 100.00% Impervious, Inflow Depth > 0.79" for 1" event
 Inflow = 0.01 cfs @ 9.97 hrs, Volume= 30 cf
 Outflow = 0.01 cfs @ 9.97 hrs, Volume= 30 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 9.97 hrs, Volume= 30 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.55' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 9.97 hrs HW=95.55' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.01 cfs @ 0.75 fps)

Pond 15P: Catch Basin



Summary for Pond WST-3: Water Storage Tank - 3

Inflow Area = 2,234 sf, 81.47% Impervious, Inflow Depth > 5.30" for 1" event
 Inflow = 0.03 cfs @ 9.97 hrs, Volume= 987 cf, Incl. 0.01 cfs Base Flow
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 91.11' @ 24.00 hrs Surf.Area= 240 sf Storage= 986 cf

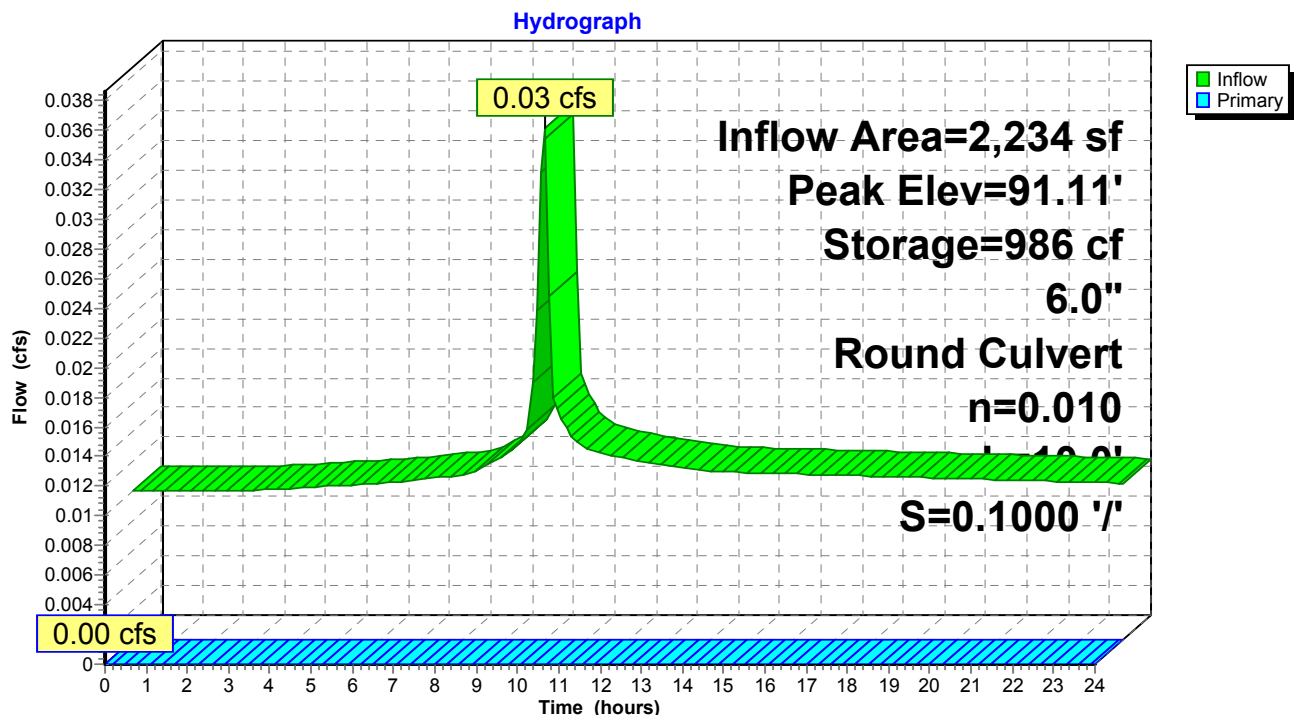
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	87.00'	1,920 cf	96.0" W x 96.0" H Box Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	94.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.50' / 93.50' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=87.01' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-3: Water Storage Tank - 3



1925 ECDLL_Current Conditions Analysis Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Prepared by {enter your company name here}

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: Upper West Side Yard Runoff Area=465 sf 50.11% Impervious Runoff Depth>1.85"
Flow Length=78' Slope=0.4300 '/ Tc=3.0 min CN=68/98 Runoff=0.01 cfs 72 cf

Subcatchment SC-12: Upper East Side Yard Runoff Area=363 sf 49.86% Impervious Runoff Depth>1.85"
Flow Length=65' Slope=0.3600 '/ Tc=3.0 min CN=68/98 Runoff=0.01 cfs 56 cf

Subcatchment SC-14: Residence Roof, Runoff Area=945 sf 100.00% Impervious Runoff Depth>2.97"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.05 cfs 234 cf

Subcatchment SC-15: Lower Level Patio Runoff Area=461 sf 100.00% Impervious Runoff Depth>2.97"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.02 cfs 114 cf

Subcatchment SC-17: Restored Temporary Runoff Area=1,516 sf 9.96% Impervious Runoff Depth>0.95"
Flow Length=50' Slope=0.2400 '/ Tc=3.0 min CN=68/98 Runoff=0.02 cfs 121 cf

Subcatchment SC-18: Lemonade berry Runoff Area=590 sf 10.00% Impervious Runoff Depth>0.30"
Flow Length=25' Slope=0.2400 '/ Tc=3.0 min CN=35/98 Runoff=0.00 cfs 15 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=130' Slope=0.2300 '/ Tc=3.0 min CN=35/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.09"
Flow Length=35' Slope=1.0000 '/ Tc=3.0 min CN=48/0 Runoff=0.00 cfs 12 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>1.88"
Flow Length=35' Slope=0.2100 '/ Tc=3.0 min CN=83/98 Runoff=0.06 cfs 330 cf

Pond 11P: Catch Basin Peak Elev=95.57' Inflow=0.01 cfs 72 cf
4.0" Round Culvert n=0.010 L=31.0' S=0.0161 '/' Outflow=0.01 cfs 72 cf

Pond 12P: Catch Basin Peak Elev=95.56' Inflow=0.01 cfs 56 cf
4.0" Round Culvert n=0.010 L=35.0' S=0.0143 '/' Outflow=0.01 cfs 56 cf

Pond 14P: Catch Basin Peak Elev=96.14' Inflow=0.05 cfs 234 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.2000 '/' Outflow=0.05 cfs 234 cf

Pond 15P: Catch Basin Peak Elev=95.60' Inflow=0.02 cfs 114 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/' Outflow=0.02 cfs 114 cf

Pond WST-3: Water Storage Tank - 3 Peak Elev=92.59' Storage=1,340 cf Inflow=0.10 cfs 1,343 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.1000 '/' Outflow=0.00 cfs 0 cf

Total Runoff Area = 14,469 sf Runoff Volume = 952 cf Average Runoff Depth = 0.79"
83.09% Pervious = 12,023 sf 16.91% Impervious = 2,446 sf

Summary for Subcatchment SC-11: Upper West Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

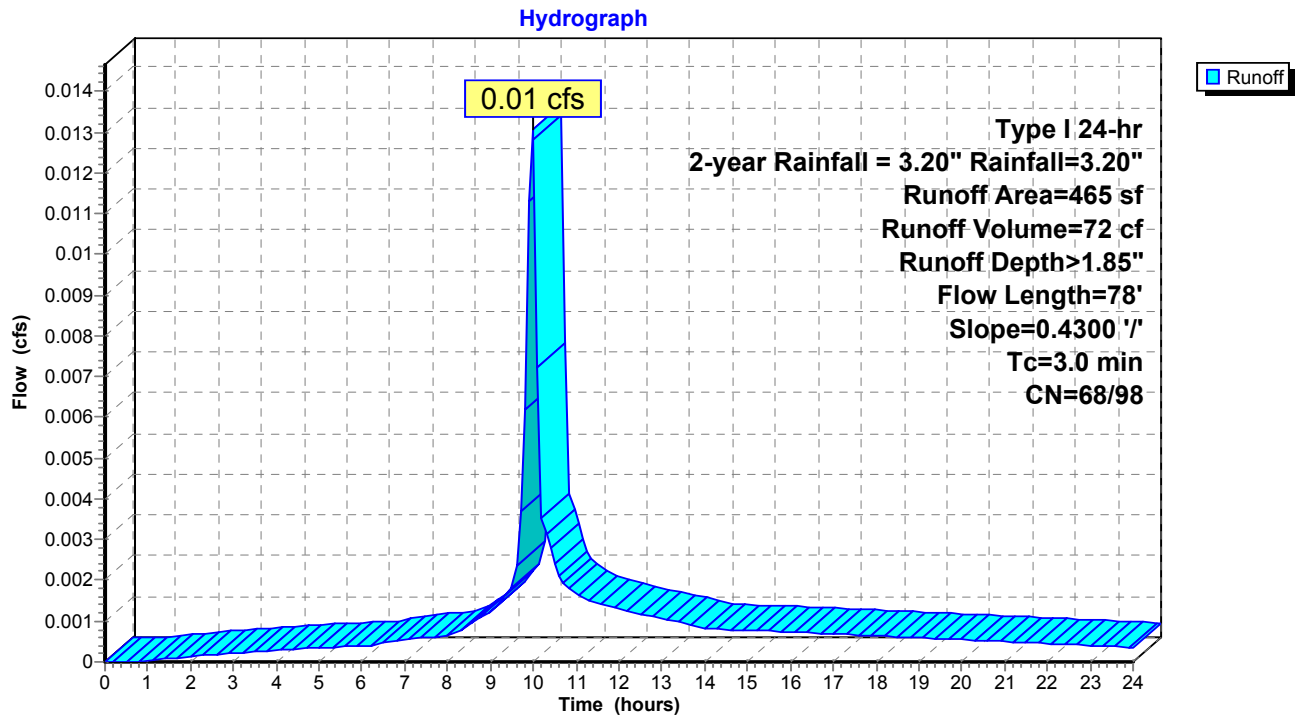
Runoff = 0.01 cfs @ 9.97 hrs, Volume= 72 cf, Depth> 1.85"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
232	68	<50% Grass cover, Poor, HSG A
233	98	Unconnected pavement, HSG A
465	83	Weighted Average
232	68	49.89% Pervious Area
233	98	50.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-11: Upper West Side Yard



Summary for Subcatchment SC-12: Upper East Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

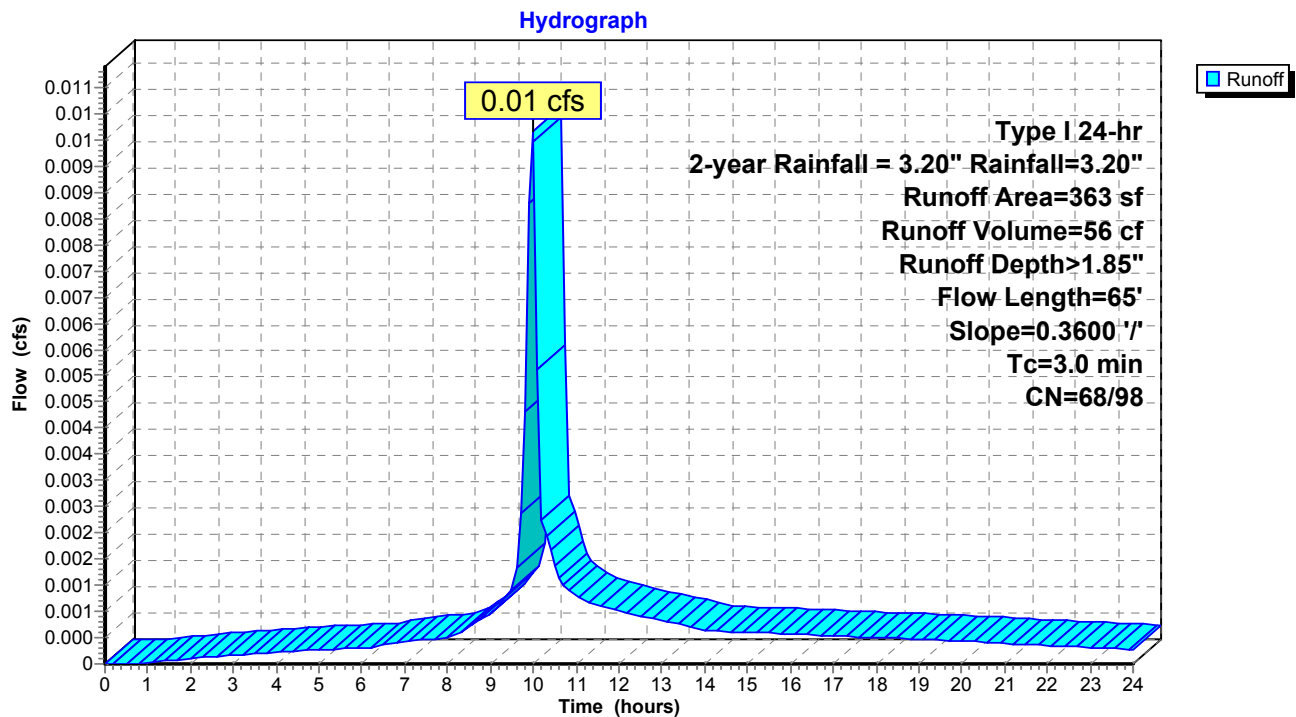
Runoff = 0.01 cfs @ 9.97 hrs, Volume= 56 cf, Depth> 1.85"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
182	68	<50% Grass cover, Poor, HSG A
181	98	Unconnected pavement, HSG A
363	83	Weighted Average
182	68	50.14% Pervious Area
181	98	49.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.9	65	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-12: Upper East Side Yard



Summary for Subcatchment SC-14: Residence Roof, South Part, With Planters

[49] Hint: $T_c < 2dt$ may require smaller dt

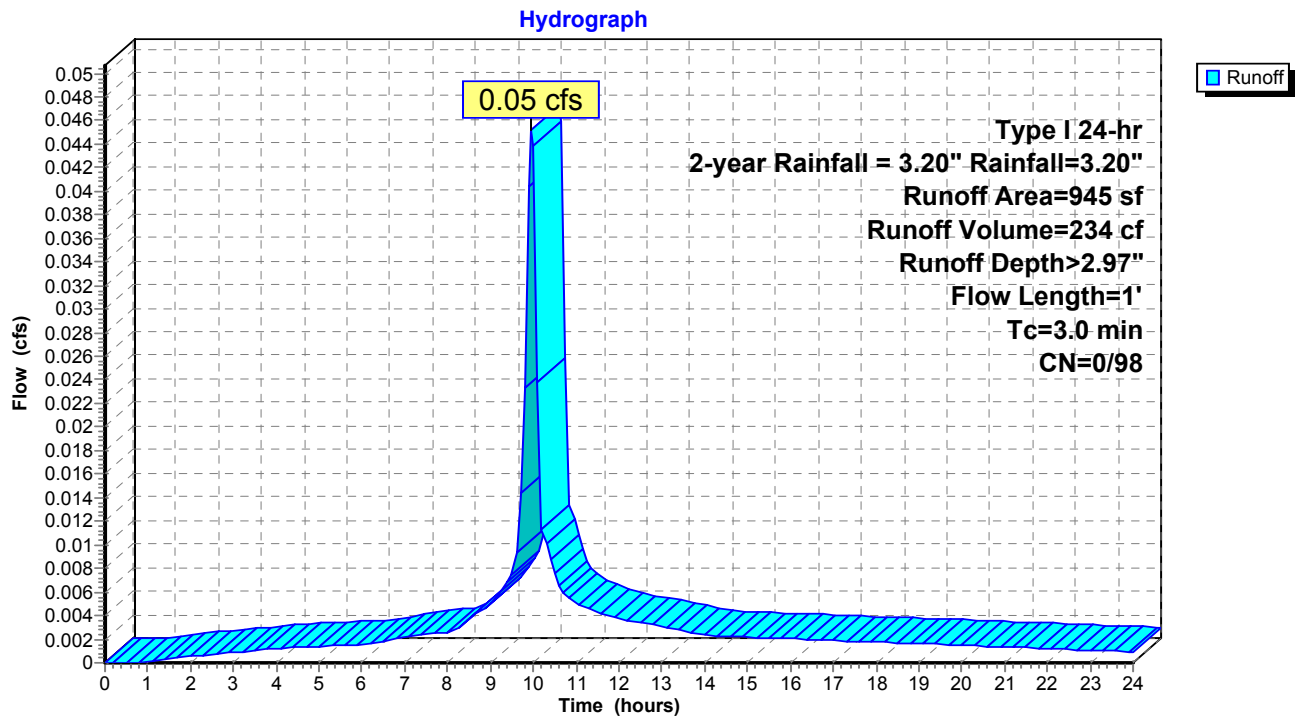
Runoff = 0.05 cfs @ 9.96 hrs, Volume= 234 cf, Depth> 2.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt = 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
945	98	Roofs, HSG A
945	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1				Total, Increased to minimum Tc = 3.0 min

Subcatchment SC-14: Residence Roof, South Part, With Planters



Summary for Subcatchment SC-15: Lower Level Patio

[49] Hint: $T_c < 2dt$ may require smaller dt

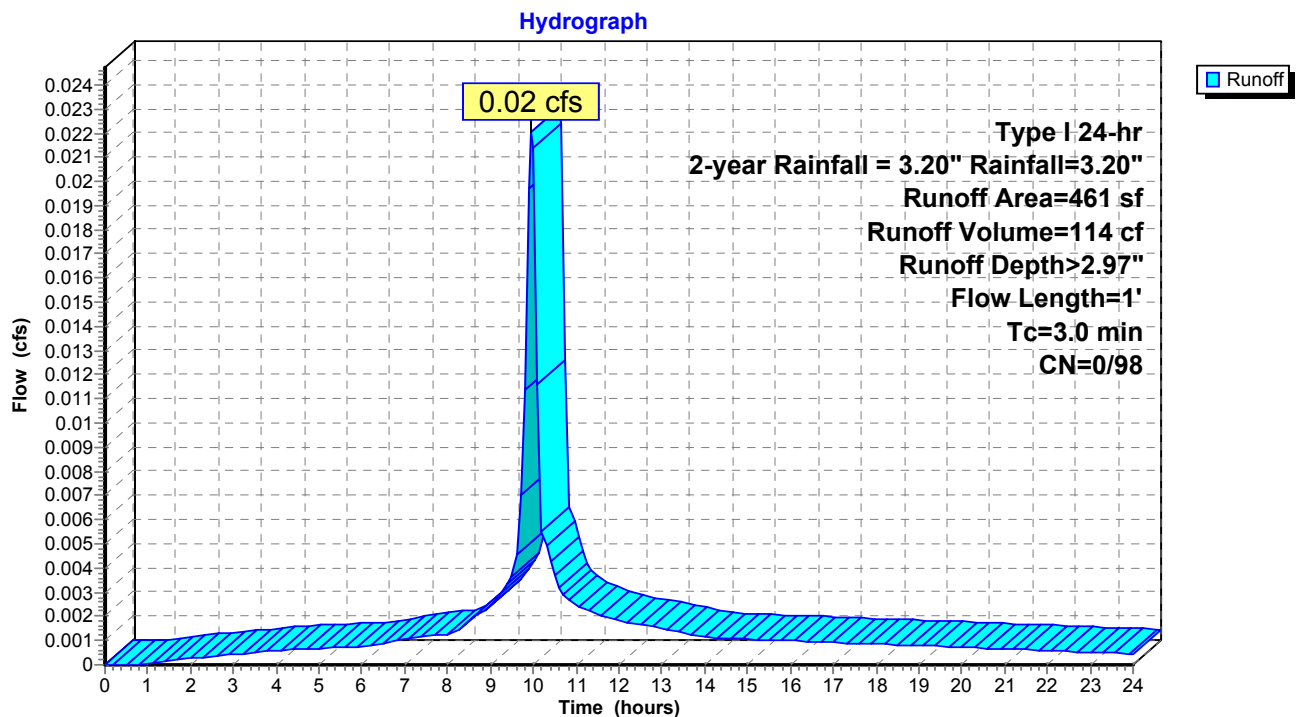
Runoff = 0.02 cfs @ 9.96 hrs, Volume= 114 cf, Depth> 2.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
461	98	Unconnected pavement, HSG A
461	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-15: Lower Level Patio



catchment SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West

[49] Hint: Tc<2dt may require smaller dt

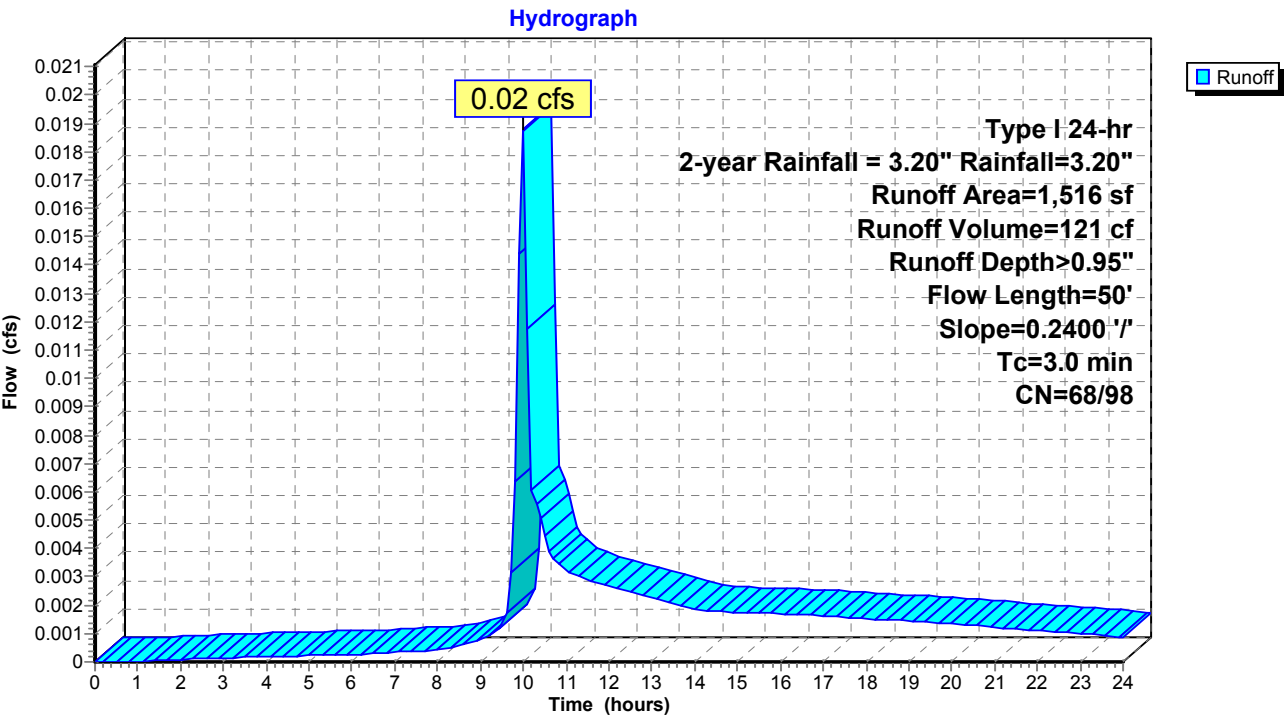
Runoff = 0.02 cfs @ 9.99 hrs, Volume= 121 cf, Depth> 0.95"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
1,365	68	<50% Grass cover, Poor, HSG A
151	98	Unconnected pavement, HSG A
1,516	71	Weighted Average
1,365	68	90.04% Pervious Area
151	98	9.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum Tc = 3.0 min			

ent SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West and E



Summary for Subcatchment SC-18: Lemonade berry mitigation area

[49] Hint: $T_c < 2dt$ may require smaller dt

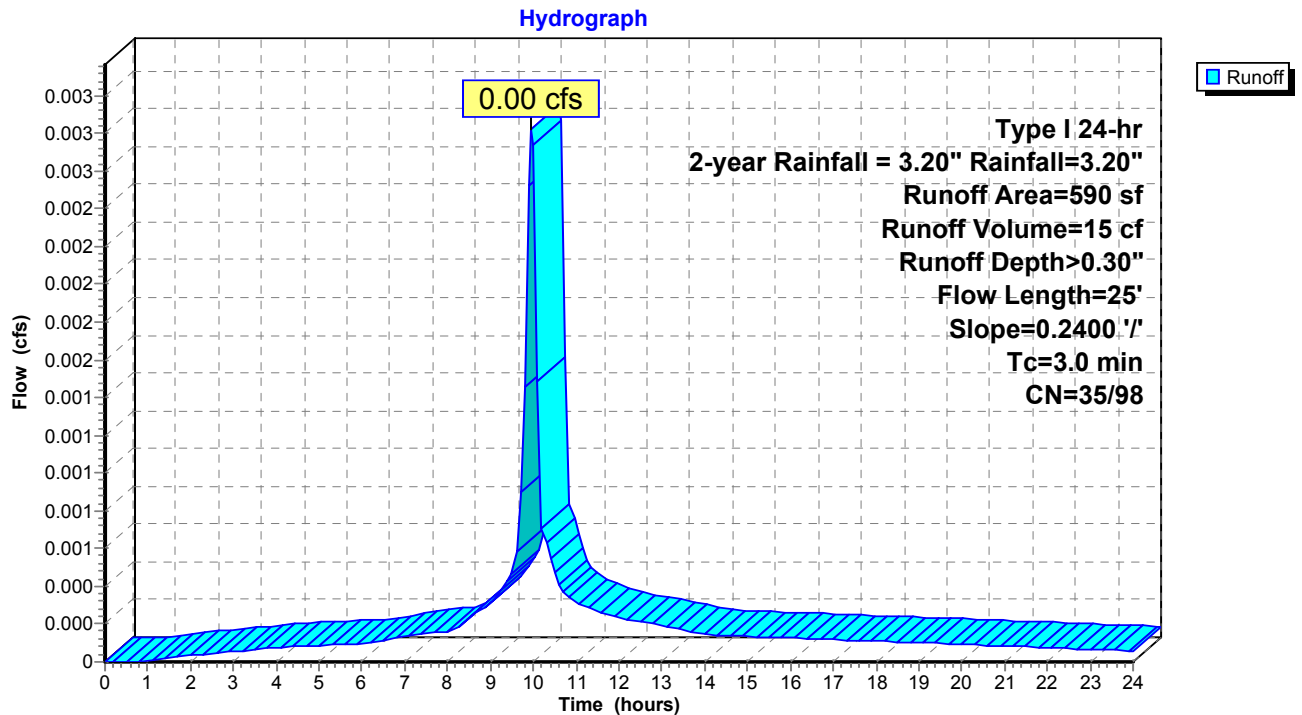
Runoff = 0.00 cfs @ 9.96 hrs, Volume= 15 cf, Depth> 0.30"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
531	35	Brush, Fair, HSG A
59	98	Unconnected pavement, HSG A
590	41	Weighted Average
531	35	90.00% Pervious Area
59	98	10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-18: Lemonade berry mitigation area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

[45] Hint: Runoff=Zero

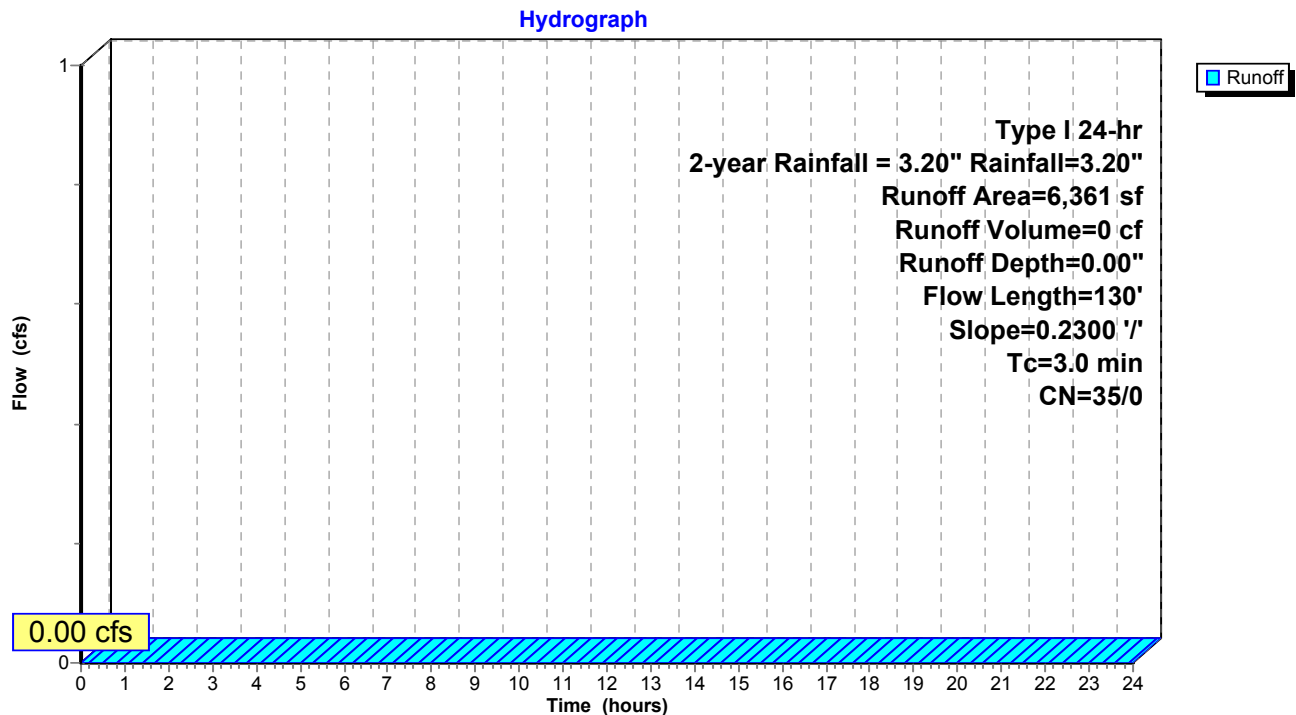
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

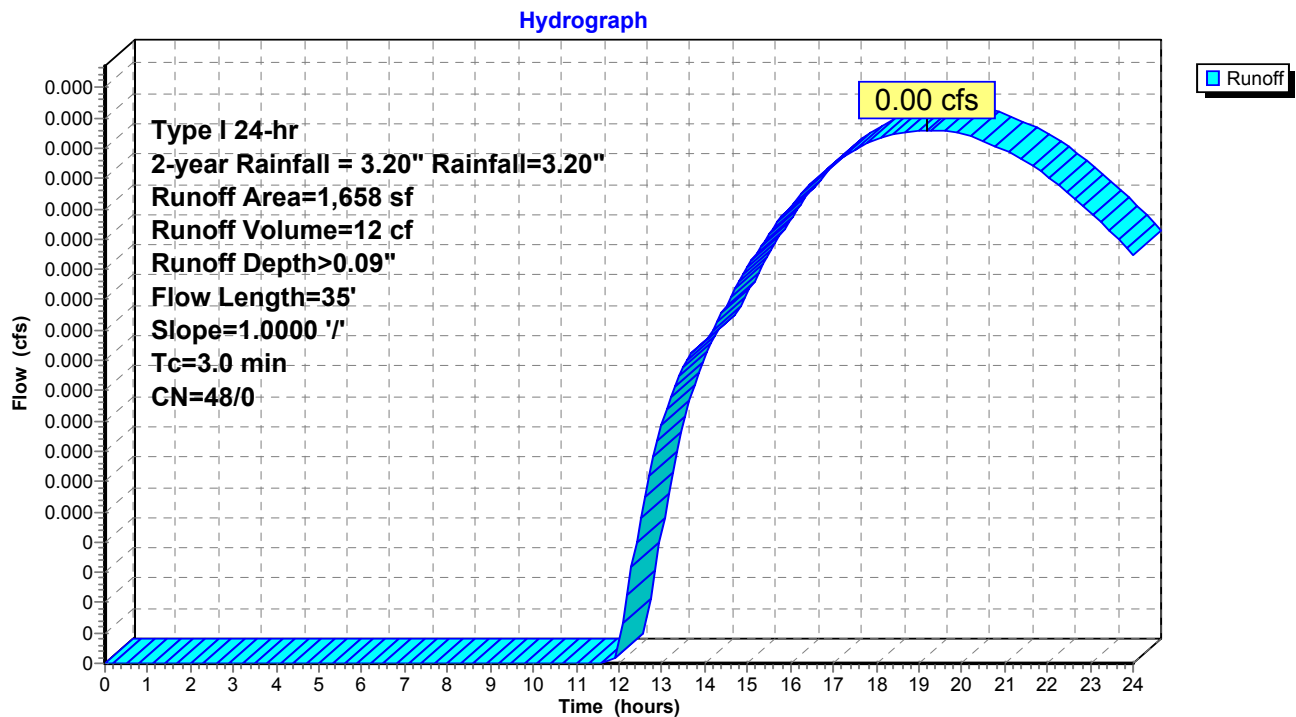
Runoff = 0.00 cfs @ 19.20 hrs, Volume= 12 cf, Depth> 0.09"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

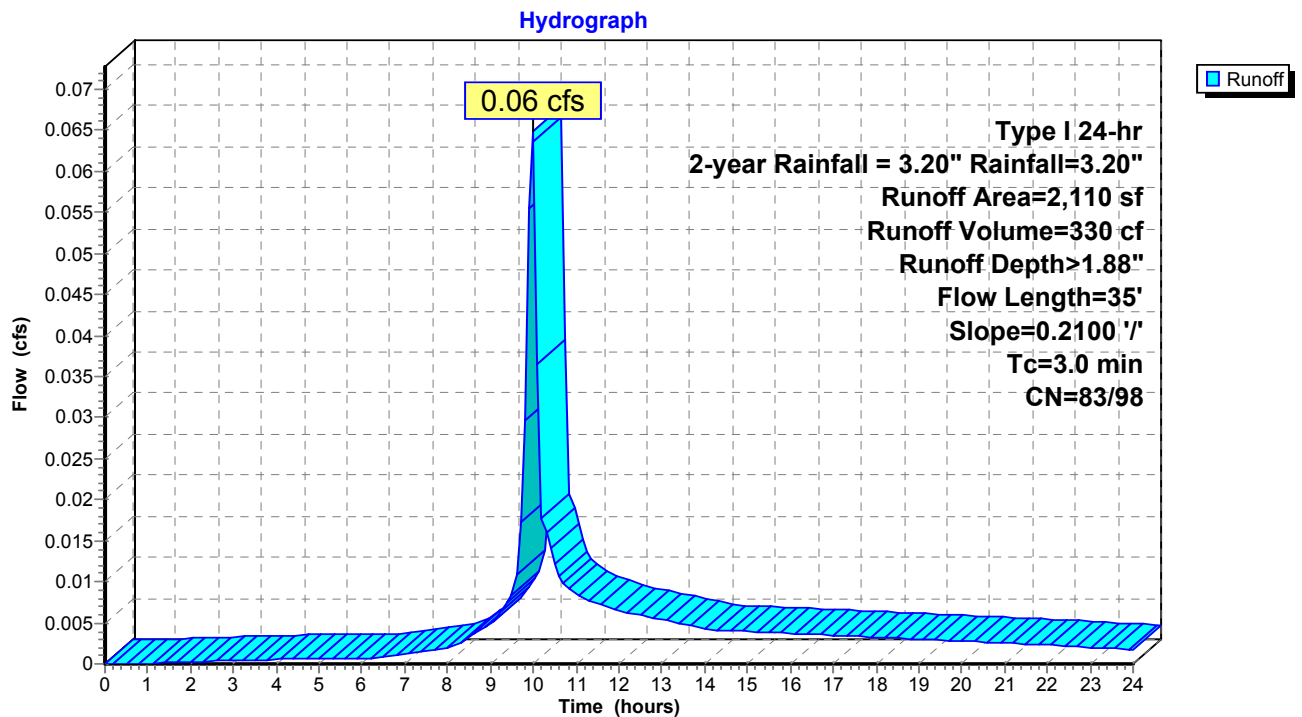
Runoff = 0.06 cfs @ 9.97 hrs, Volume= 330 cf, Depth> 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.7	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-21: Beach area



Summary for Pond 11P: Catch Basin

[57] Hint: Peaked at 95.57' (Flood elevation advised)

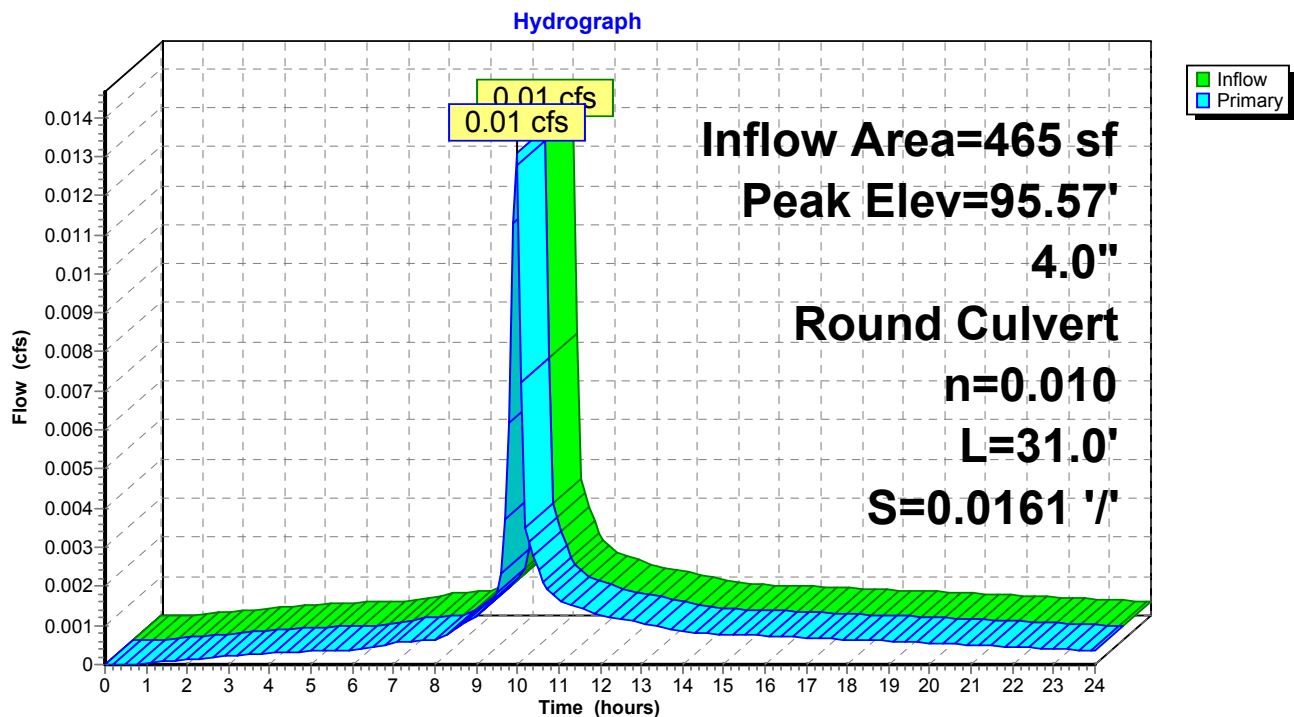
Inflow Area = 465 sf, 50.11% Impervious, Inflow Depth > 1.85" for 2-year Rainfall = 3.20" event
 Inflow = 0.01 cfs @ 9.97 hrs, Volume= 72 cf
 Outflow = 0.01 cfs @ 9.97 hrs, Volume= 72 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 9.97 hrs, Volume= 72 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.57' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0161 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 9.97 hrs HW=95.57' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.01 cfs @ 0.91 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Catch Basin

[57] Hint: Peaked at 95.56' (Flood elevation advised)

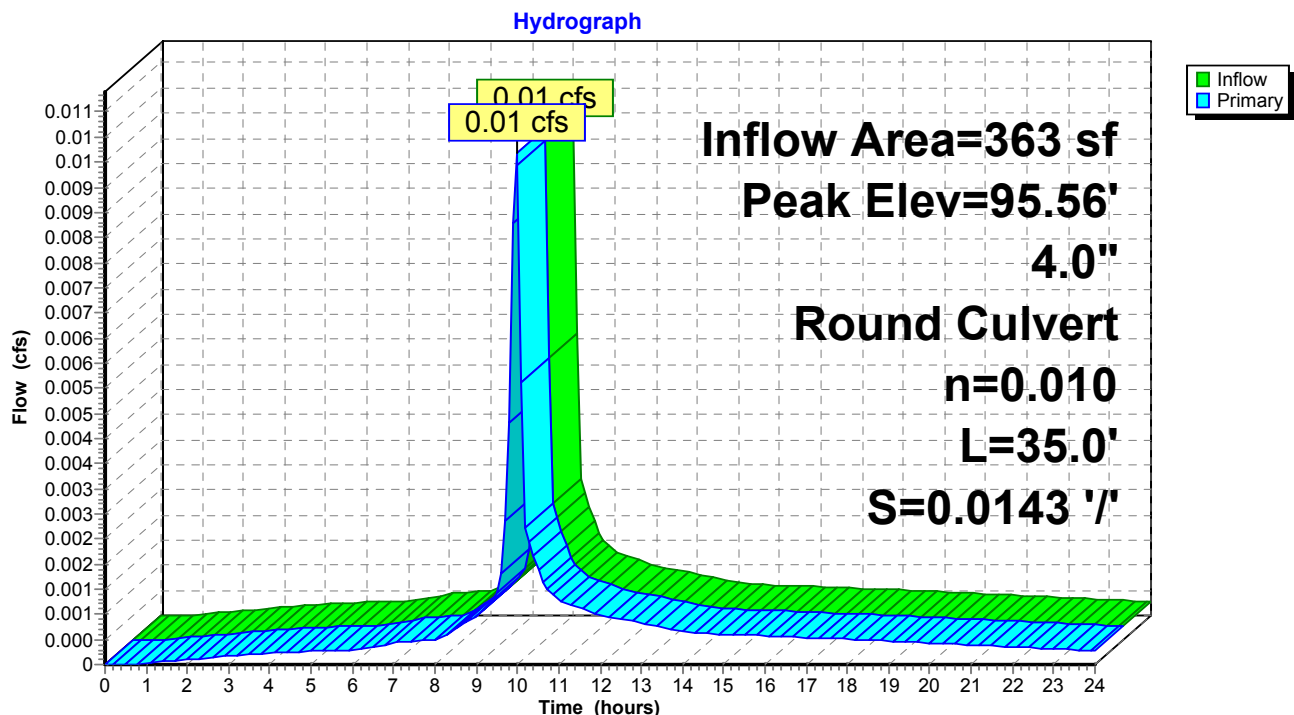
Inflow Area = 363 sf, 49.86% Impervious, Inflow Depth > 1.85" for 2-year Rainfall = 3.20" event
 Inflow = 0.01 cfs @ 9.97 hrs, Volume= 56 cf
 Outflow = 0.01 cfs @ 9.97 hrs, Volume= 56 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 9.97 hrs, Volume= 56 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.56' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0143 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 9.97 hrs HW=95.56' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.01 cfs @ 0.85 fps)

Pond 12P: Catch Basin



Summary for Pond 14P: Catch Basin

[57] Hint: Peaked at 96.14' (Flood elevation advised)

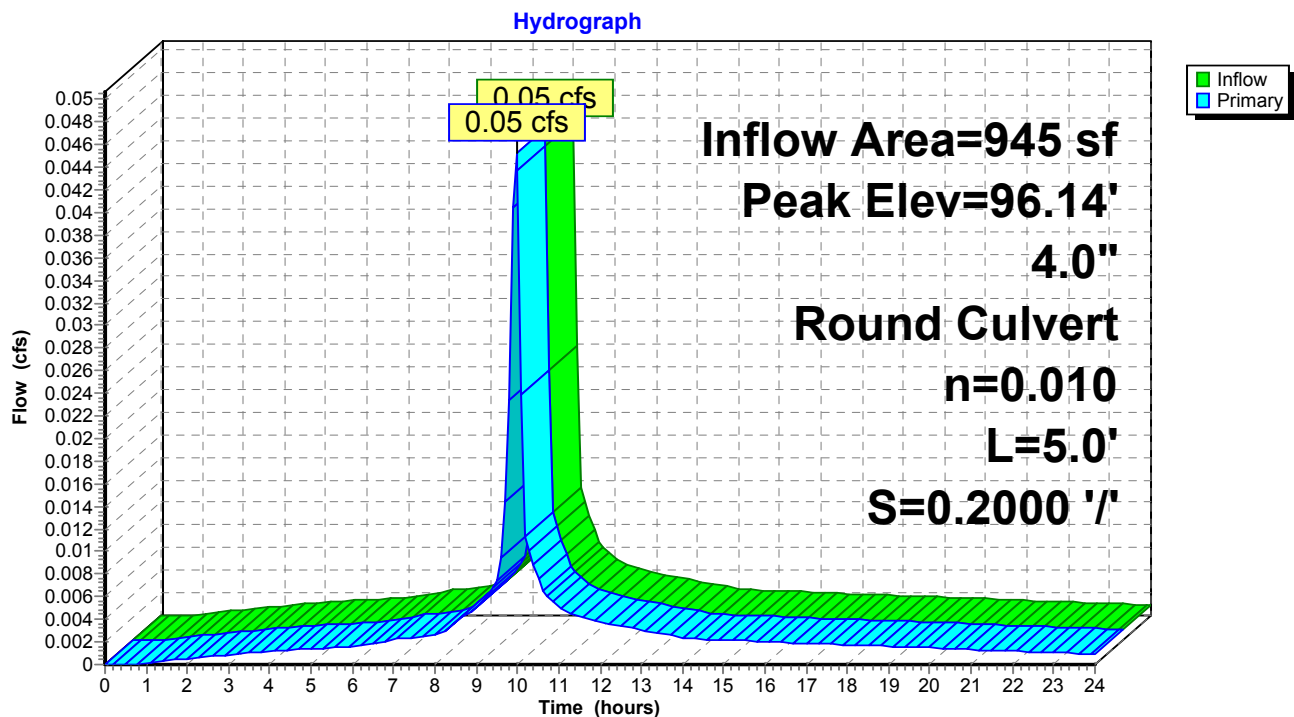
Inflow Area = 945 sf, 100.00% Impervious, Inflow Depth > 2.97" for 2-year Rainfall = 3.20" event
 Inflow = 0.05 cfs @ 9.96 hrs, Volume= 234 cf
 Outflow = 0.05 cfs @ 9.96 hrs, Volume= 234 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 9.96 hrs, Volume= 234 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 96.14' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	96.00'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.00' / 95.00' S= 0.2000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.04 cfs @ 9.96 hrs HW=96.14' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.04 cfs @ 1.26 fps)

Pond 14P: Catch Basin



Summary for Pond 15P: Catch Basin

[57] Hint: Peaked at 95.60' (Flood elevation advised)

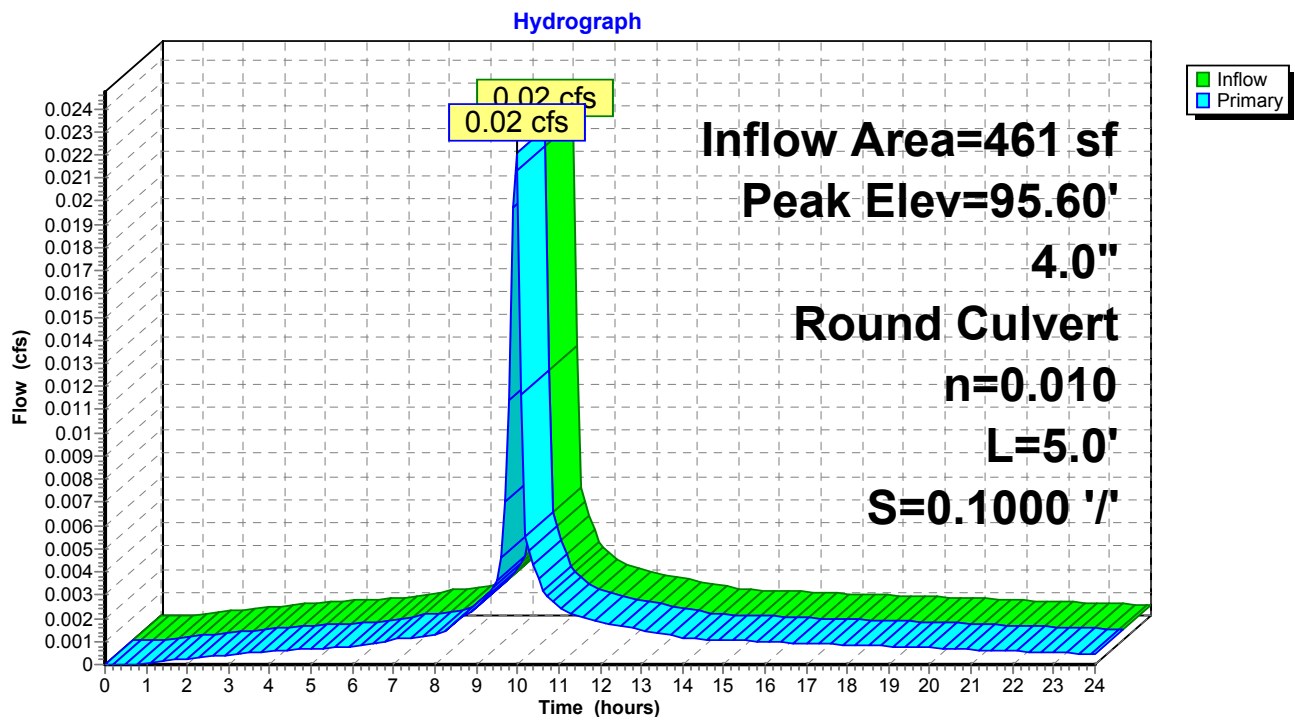
Inflow Area = 461 sf, 100.00% Impervious, Inflow Depth > 2.97" for 2-year Rainfall = 3.20" event
 Inflow = 0.02 cfs @ 9.96 hrs, Volume= 114 cf
 Outflow = 0.02 cfs @ 9.96 hrs, Volume= 114 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.96 hrs, Volume= 114 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.60' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.96 hrs HW=95.59' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.02 cfs @ 1.04 fps)

Pond 15P: Catch Basin



Summary for Pond WST-3: Water Storage Tank - 3

Inflow Area = 2,234 sf, 81.47% Impervious, Inflow Depth > 7.21" for 2-year Rainfall = 3.20" event
 Inflow = 0.10 cfs @ 9.97 hrs, Volume= 1,343 cf, Incl. 0.01 cfs Base Flow
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 92.59' @ 24.00 hrs Surf.Area= 240 sf Storage= 1,340 cf

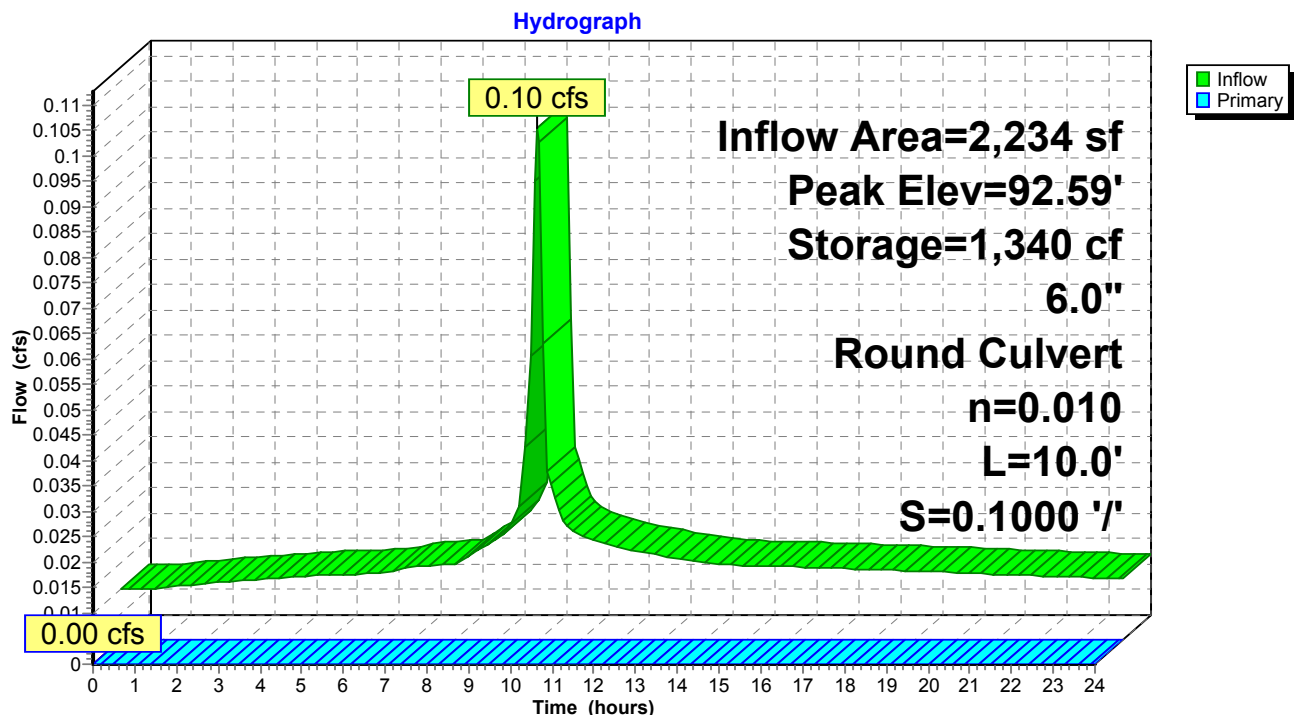
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	87.00'	1,920 cf	96.0" W x 96.0" H Box Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	94.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.50' / 93.50' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=87.01' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-3: Water Storage Tank - 3



1925 ECDLL_Current Conditions Analysis Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: Upper West Side Yard Runoff Area=465 sf 50.11% Impervious Runoff Depth>2.99"
Flow Length=78' Slope=0.4300 '/ Tc=3.0 min CN=68/98 Runoff=0.02 cfs 116 cf

Subcatchment SC-12: Upper East Side Yard Runoff Area=363 sf 49.86% Impervious Runoff Depth>2.98"
Flow Length=65' Slope=0.3600 '/ Tc=3.0 min CN=68/98 Runoff=0.02 cfs 90 cf

Subcatchment SC-14: Residence Roof, Runoff Area=945 sf 100.00% Impervious Runoff Depth>4.37"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.07 cfs 344 cf

Subcatchment SC-15: Lower Level Patio Runoff Area=461 sf 100.00% Impervious Runoff Depth>4.37"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.03 cfs 168 cf

Subcatchment SC-17: Restored Temporary Runoff Area=1,516 sf 9.96% Impervious Runoff Depth>1.88"
Flow Length=50' Slope=0.2400 '/ Tc=3.0 min CN=68/98 Runoff=0.04 cfs 238 cf

Subcatchment SC-18: Lemonade berry Runoff Area=590 sf 10.00% Impervious Runoff Depth>0.47"
Flow Length=25' Slope=0.2400 '/ Tc=3.0 min CN=35/98 Runoff=0.00 cfs 23 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth>0.04"
Flow Length=130' Slope=0.2300 '/ Tc=3.0 min CN=35/0 Runoff=0.00 cfs 22 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.45"
Flow Length=35' Slope=1.0000 '/ Tc=3.0 min CN=48/0 Runoff=0.00 cfs 62 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>3.13"
Flow Length=35' Slope=0.2100 '/ Tc=3.0 min CN=83/98 Runoff=0.11 cfs 550 cf

Pond 11P: Catch Basin Peak Elev=95.60' Inflow=0.02 cfs 116 cf
4.0" Round Culvert n=0.010 L=31.0' S=0.0161 '/ Outflow=0.02 cfs 116 cf

Pond 12P: Catch Basin Peak Elev=95.58' Inflow=0.02 cfs 90 cf
4.0" Round Culvert n=0.010 L=35.0' S=0.0143 '/ Outflow=0.02 cfs 90 cf

Pond 14P: Catch Basin Peak Elev=96.17' Inflow=0.07 cfs 344 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.2000 '/ Outflow=0.07 cfs 344 cf

Pond 15P: Catch Basin Peak Elev=95.62' Inflow=0.03 cfs 168 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/ Outflow=0.03 cfs 168 cf

Pond WST-3: Water Storage Tank - 3 Peak Elev=93.60' Storage=1,584 cf Inflow=0.15 cfs 1,586 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.1000 '/ Outflow=0.00 cfs 0 cf

Total Runoff Area = 14,469 sf Runoff Volume = 1,613 cf Average Runoff Depth = 1.34"
83.09% Pervious = 12,023 sf 16.91% Impervious = 2,446 sf

Summary for Subcatchment SC-11: Upper West Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

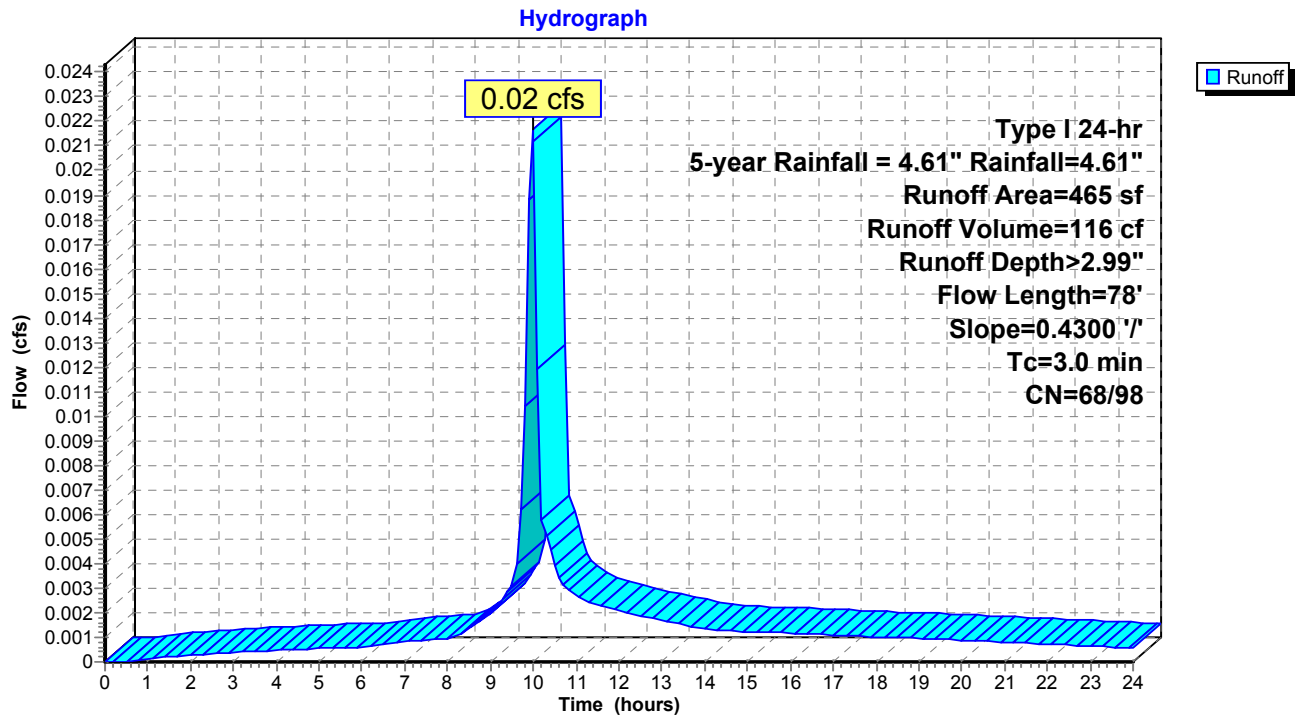
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 116 cf, Depth> 2.99"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
232	68	<50% Grass cover, Poor, HSG A
233	98	Unconnected pavement, HSG A
465	83	Weighted Average
232	68	49.89% Pervious Area
233	98	50.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-11: Upper West Side Yard



Summary for Subcatchment SC-12: Upper East Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

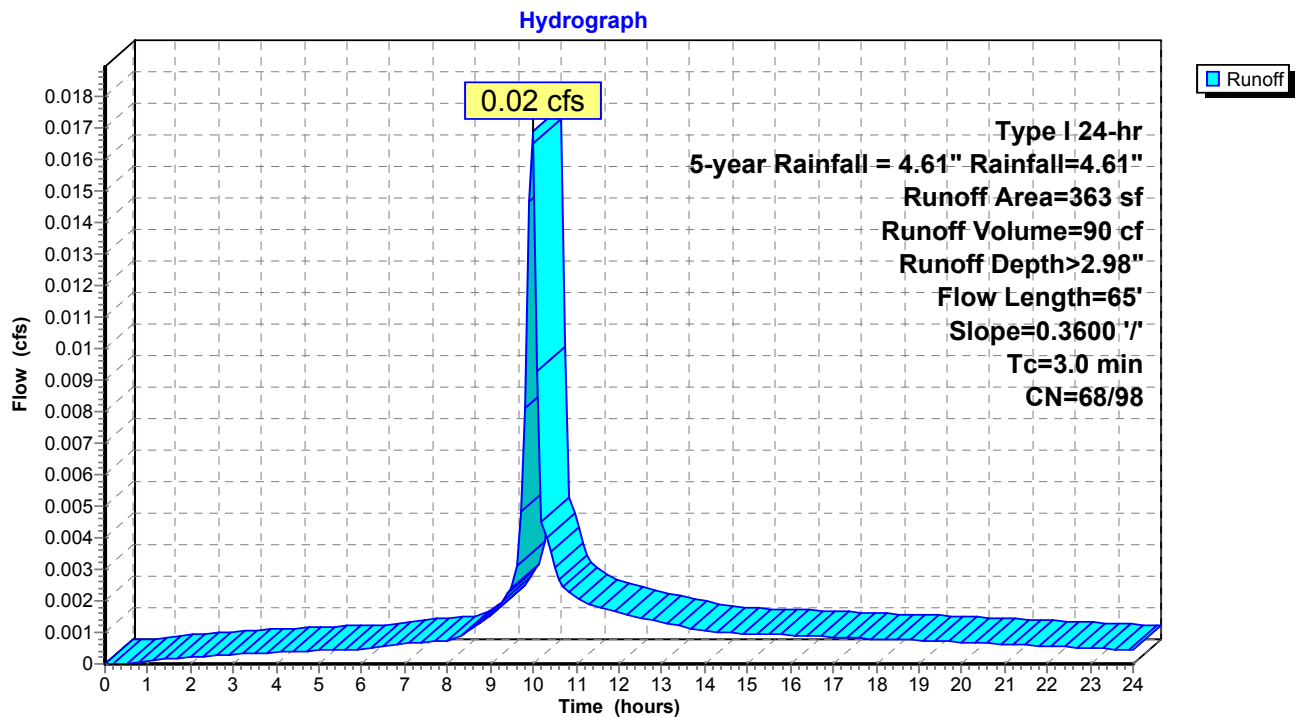
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 90 cf, Depth> 2.98"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
182	68	<50% Grass cover, Poor, HSG A
181	98	Unconnected pavement, HSG A
363	83	Weighted Average
182	68	50.14% Pervious Area
181	98	49.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	65	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-12: Upper East Side Yard



Summary for Subcatchment SC-14: Residence Roof, South Part, With Planters

[49] Hint: $T_c < 2dt$ may require smaller dt

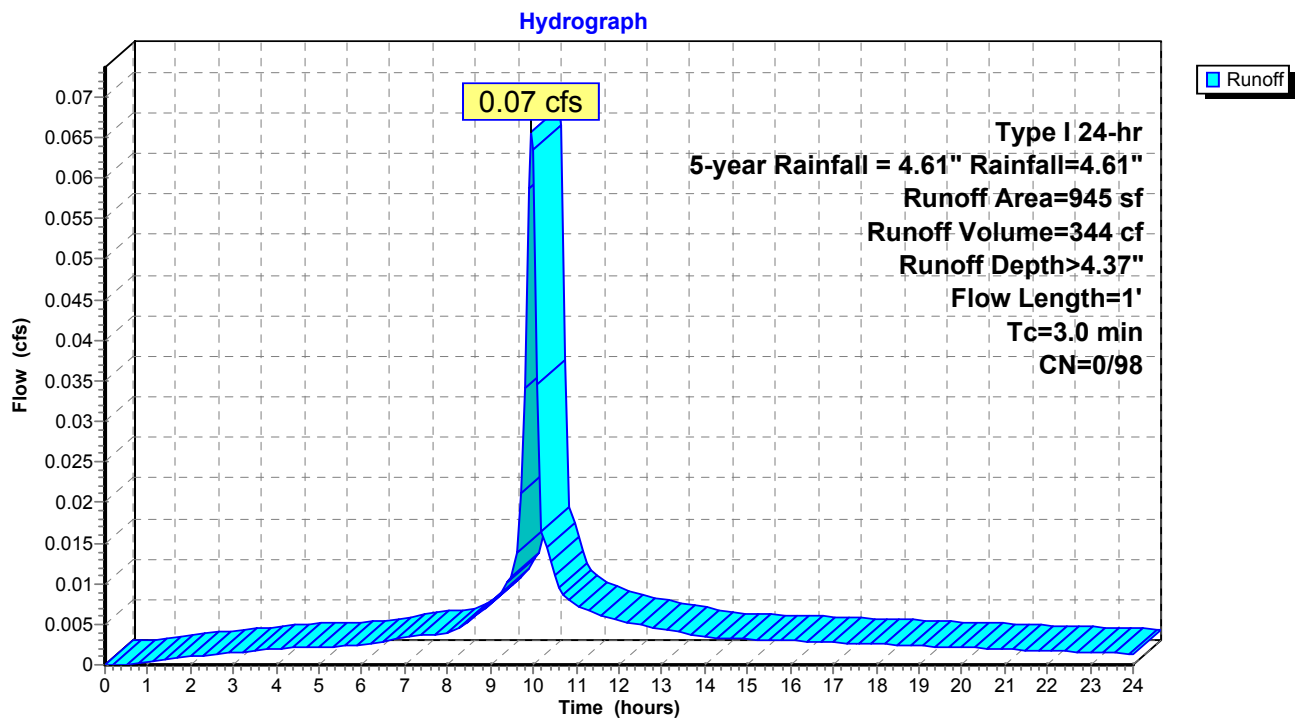
Runoff = 0.07 cfs @ 9.96 hrs, Volume= 344 cf, Depth> 4.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt = 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
945	98	Roofs, HSG A
945	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1				Total, Increased to minimum Tc = 3.0 min

Subcatchment SC-14: Residence Roof, South Part, With Planters



Summary for Subcatchment SC-15: Lower Level Patio

[49] Hint: $T_c < 2dt$ may require smaller dt

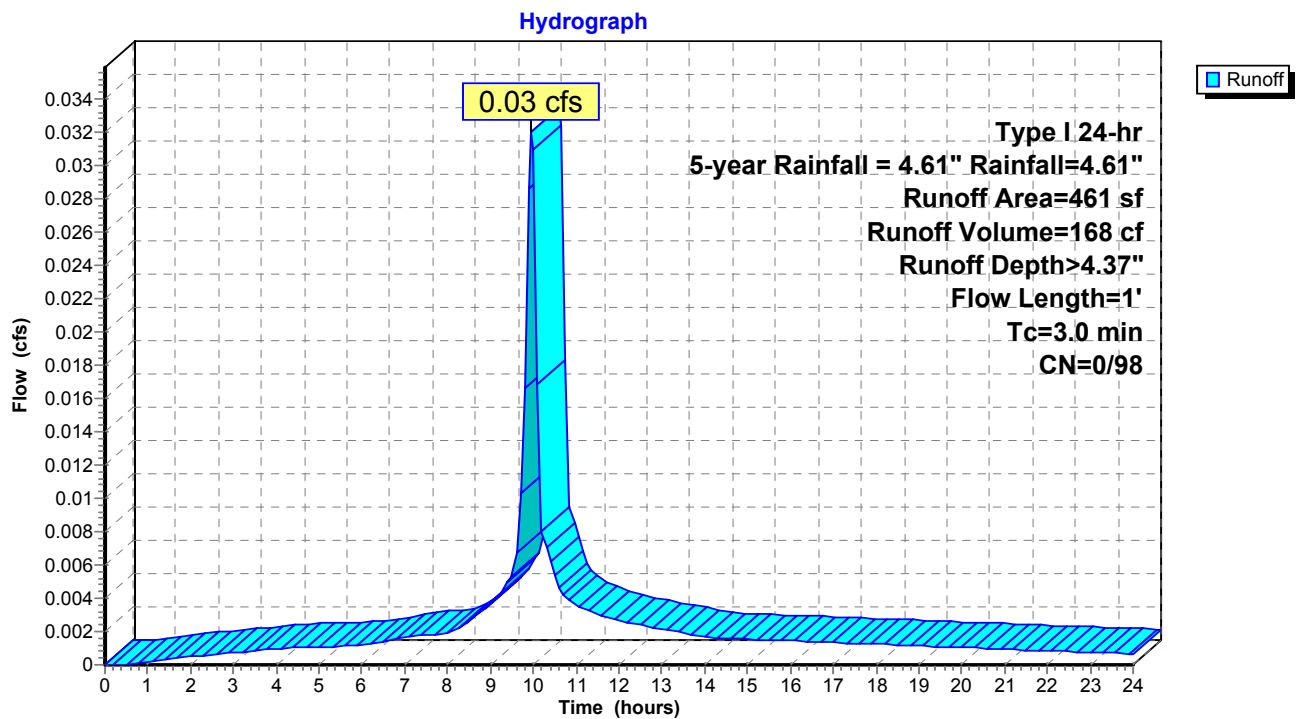
Runoff = 0.03 cfs @ 9.96 hrs, Volume= 168 cf, Depth> 4.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
461	98	Unconnected pavement, HSG A
461	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-15: Lower Level Patio



Catchment SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West and E

[49] Hint: Tc<2dt may require smaller dt

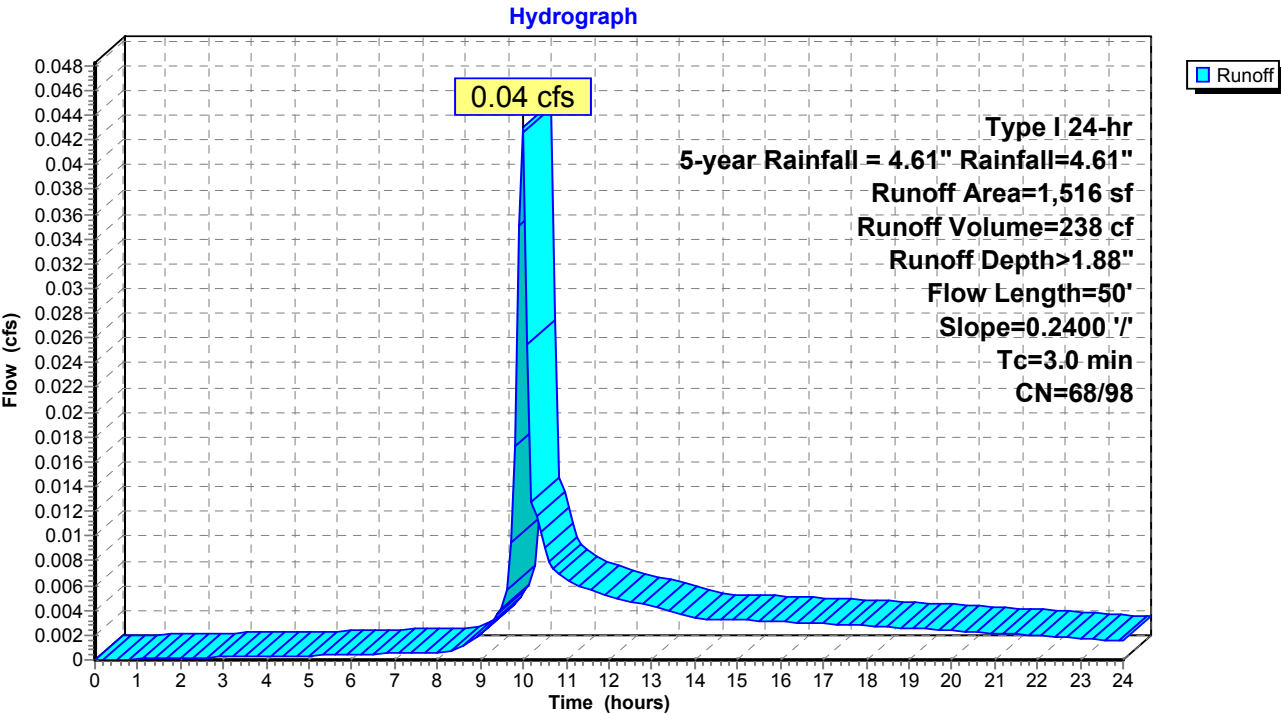
Runoff = 0.04 cfs @ 9.98 hrs, Volume= 238 cf, Depth> 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
1,365	68	<50% Grass cover, Poor, HSG A
151	98	Unconnected pavement, HSG A
1,516	71	Weighted Average
1,365	68	90.04% Pervious Area
151	98	9.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum Tc = 3.0 min			

ent SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West and E



Summary for Subcatchment SC-18: Lemonade berry mitigation area

[49] Hint: $T_c < 2dt$ may require smaller dt

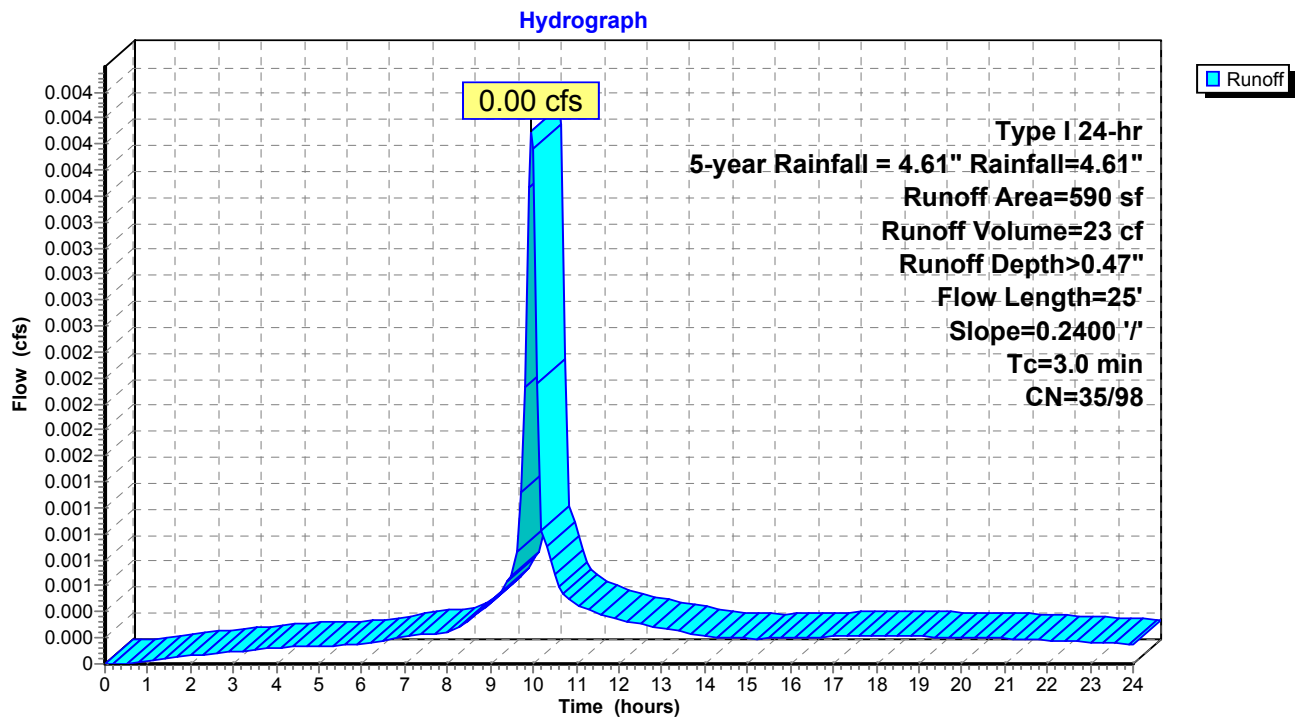
Runoff = 0.00 cfs @ 9.96 hrs, Volume= 23 cf, Depth> 0.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
531	35	Brush, Fair, HSG A
59	98	Unconnected pavement, HSG A
590	41	Weighted Average
531	35	90.00% Pervious Area
59	98	10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.5	25	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-18: Lemonade berry mitigation area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

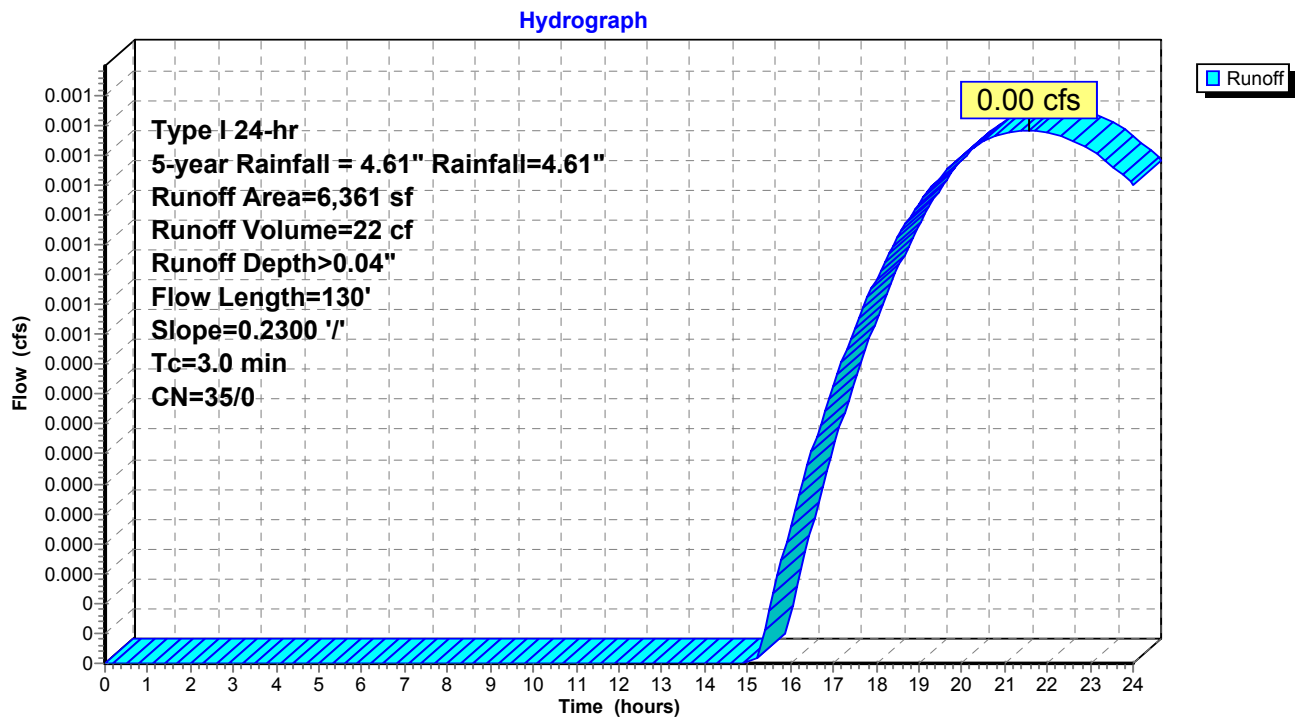
Runoff = 0.00 cfs @ 21.55 hrs, Volume= 22 cf, Depth> 0.04"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

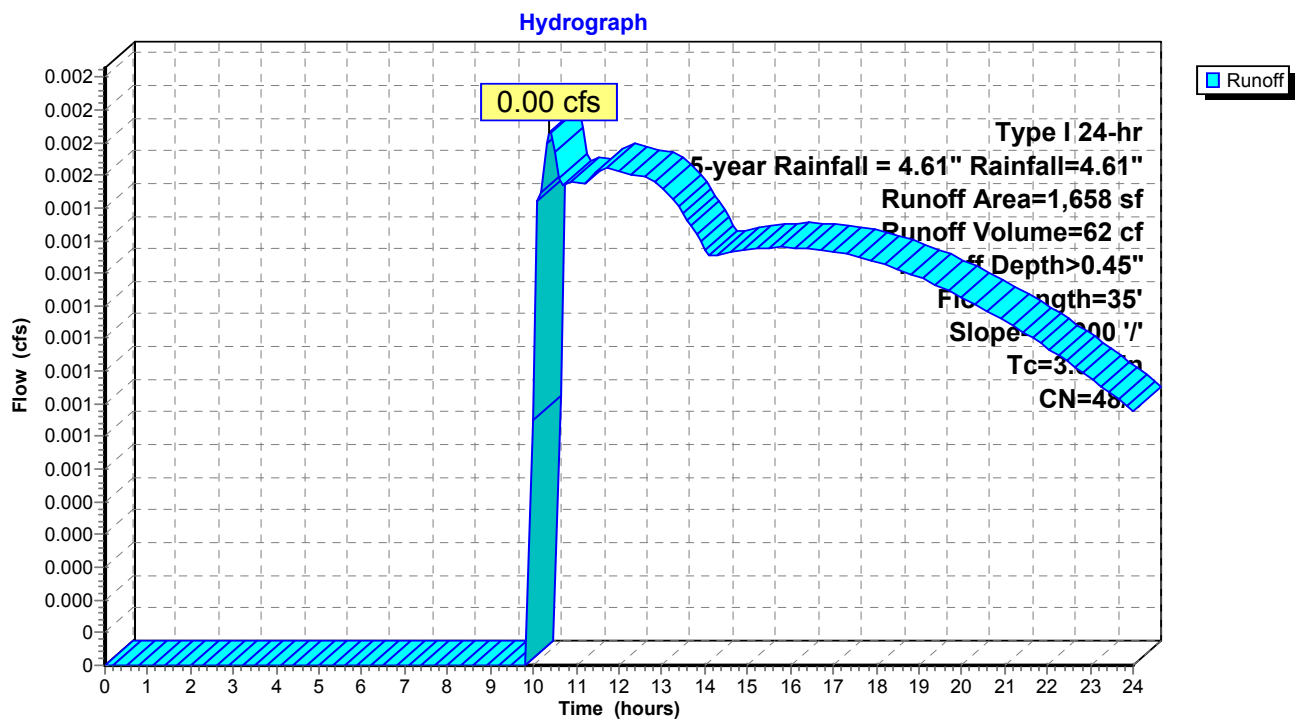
Runoff = 0.00 cfs @ 10.39 hrs, Volume= 62 cf, Depth> 0.45"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

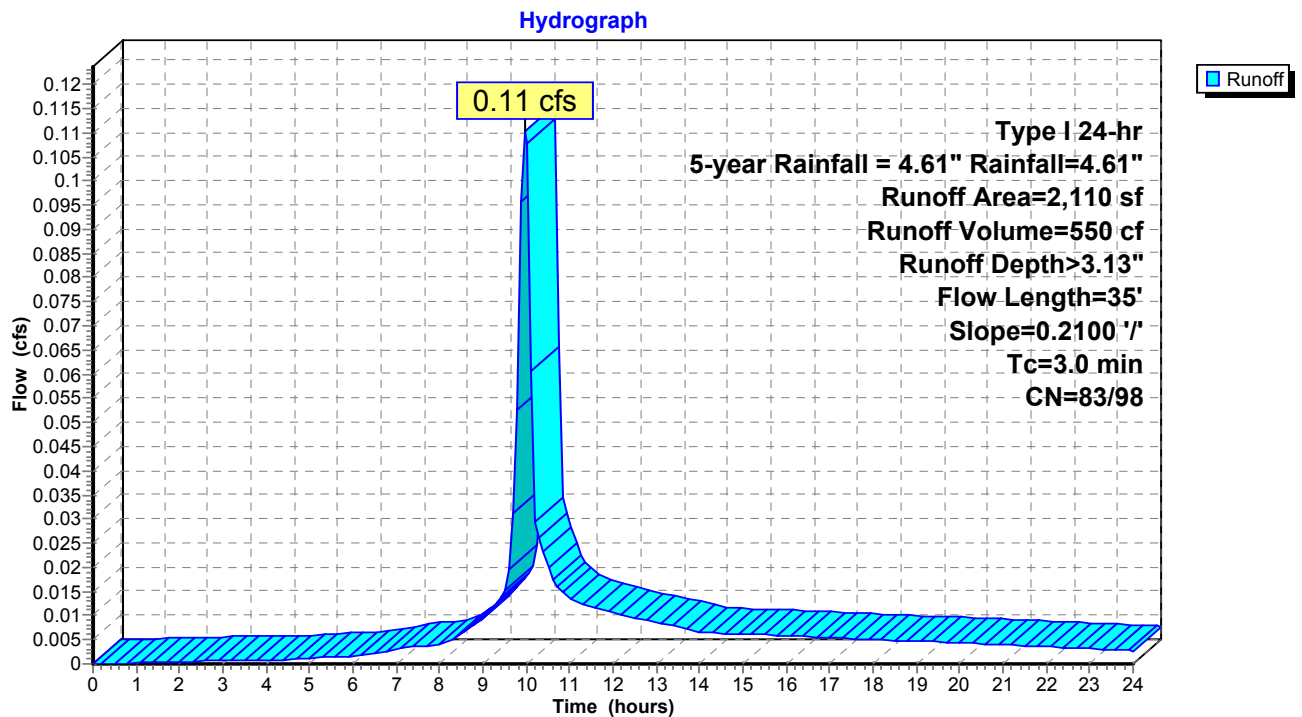
Runoff = 0.11 cfs @ 9.97 hrs, Volume= 550 cf, Depth> 3.13"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.7	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-21: Beach area



Summary for Pond 11P: Catch Basin

[57] Hint: Peaked at 95.60' (Flood elevation advised)

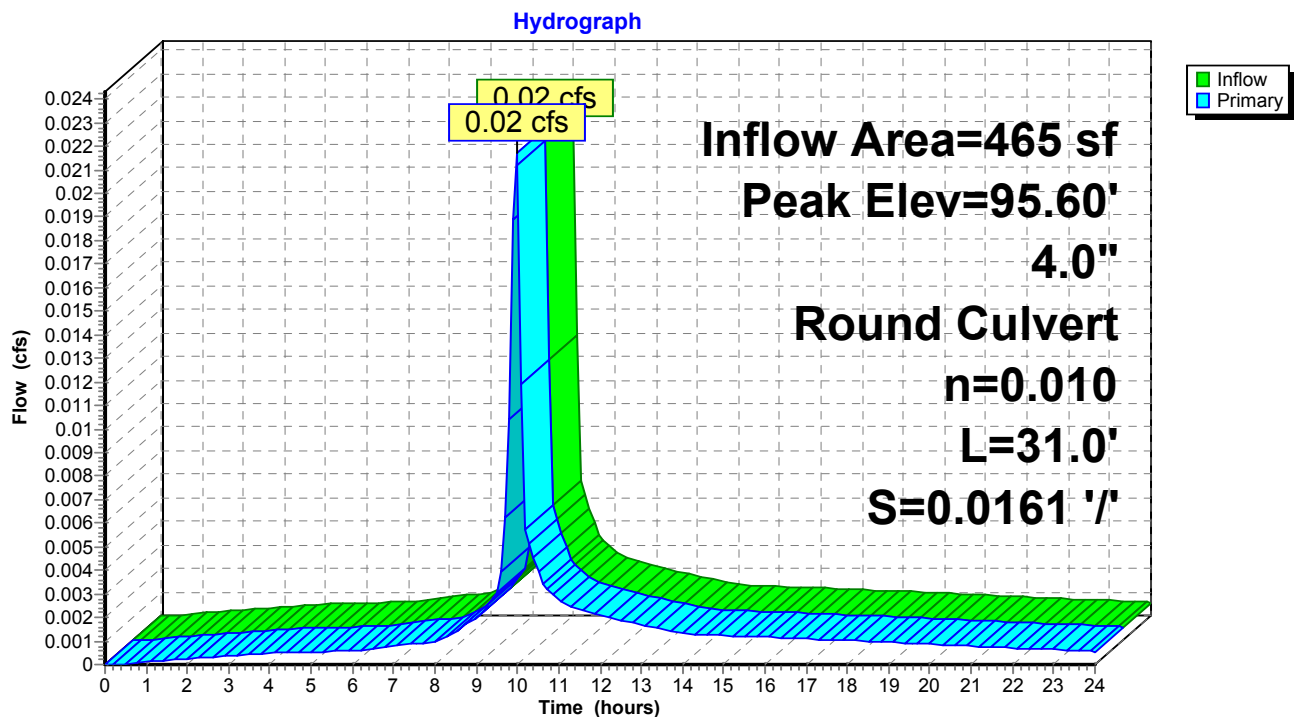
Inflow Area = 465 sf, 50.11% Impervious, Inflow Depth > 2.99" for 5-year Rainfall = 4.61" event
 Inflow = 0.02 cfs @ 9.97 hrs, Volume= 116 cf
 Outflow = 0.02 cfs @ 9.97 hrs, Volume= 116 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.97 hrs, Volume= 116 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.60' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0161 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.97 hrs HW=95.59' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.02 cfs @ 1.04 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Catch Basin

[57] Hint: Peaked at 95.58' (Flood elevation advised)

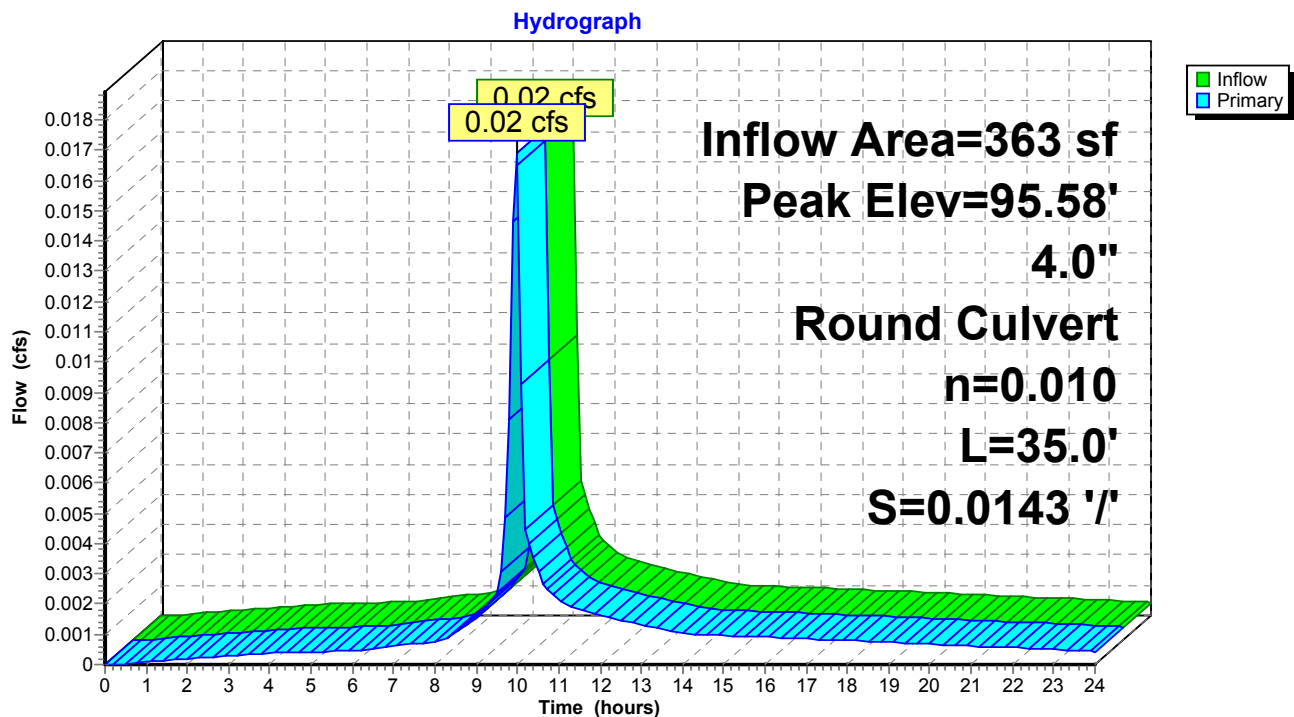
Inflow Area = 363 sf, 49.86% Impervious, Inflow Depth > 2.98" for 5-year Rainfall = 4.61" event
 Inflow = 0.02 cfs @ 9.97 hrs, Volume= 90 cf
 Outflow = 0.02 cfs @ 9.97 hrs, Volume= 90 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.97 hrs, Volume= 90 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.58' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0143 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.97 hrs HW=95.58' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.02 cfs @ 0.97 fps)

Pond 12P: Catch Basin



Summary for Pond 14P: Catch Basin

[57] Hint: Peaked at 96.17' (Flood elevation advised)

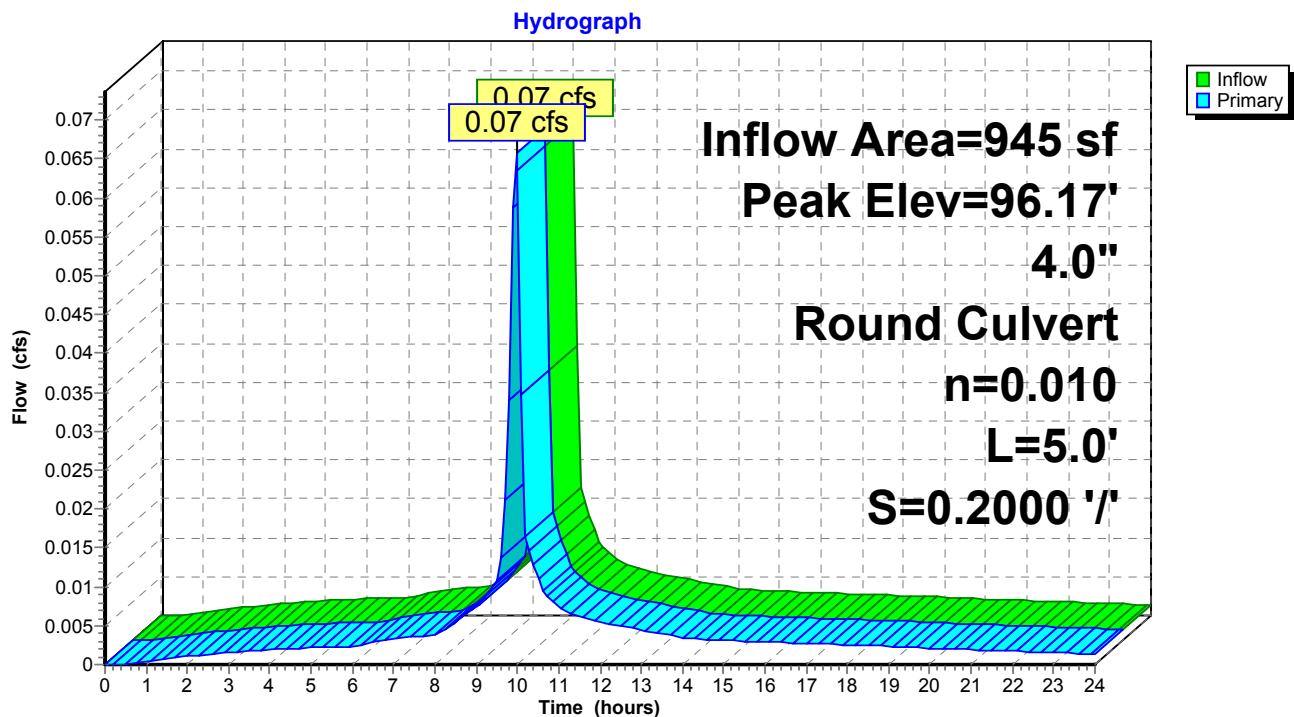
Inflow Area = 945 sf, 100.00% Impervious, Inflow Depth > 4.37" for 5-year Rainfall = 4.61" event
 Inflow = 0.07 cfs @ 9.96 hrs, Volume= 344 cf
 Outflow = 0.07 cfs @ 9.96 hrs, Volume= 344 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.07 cfs @ 9.96 hrs, Volume= 344 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 96.17' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	96.00'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.00' / 95.00' S= 0.2000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.06 cfs @ 9.96 hrs HW=96.17' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.06 cfs @ 1.40 fps)

Pond 14P: Catch Basin



Summary for Pond 15P: Catch Basin

[57] Hint: Peaked at 95.62' (Flood elevation advised)

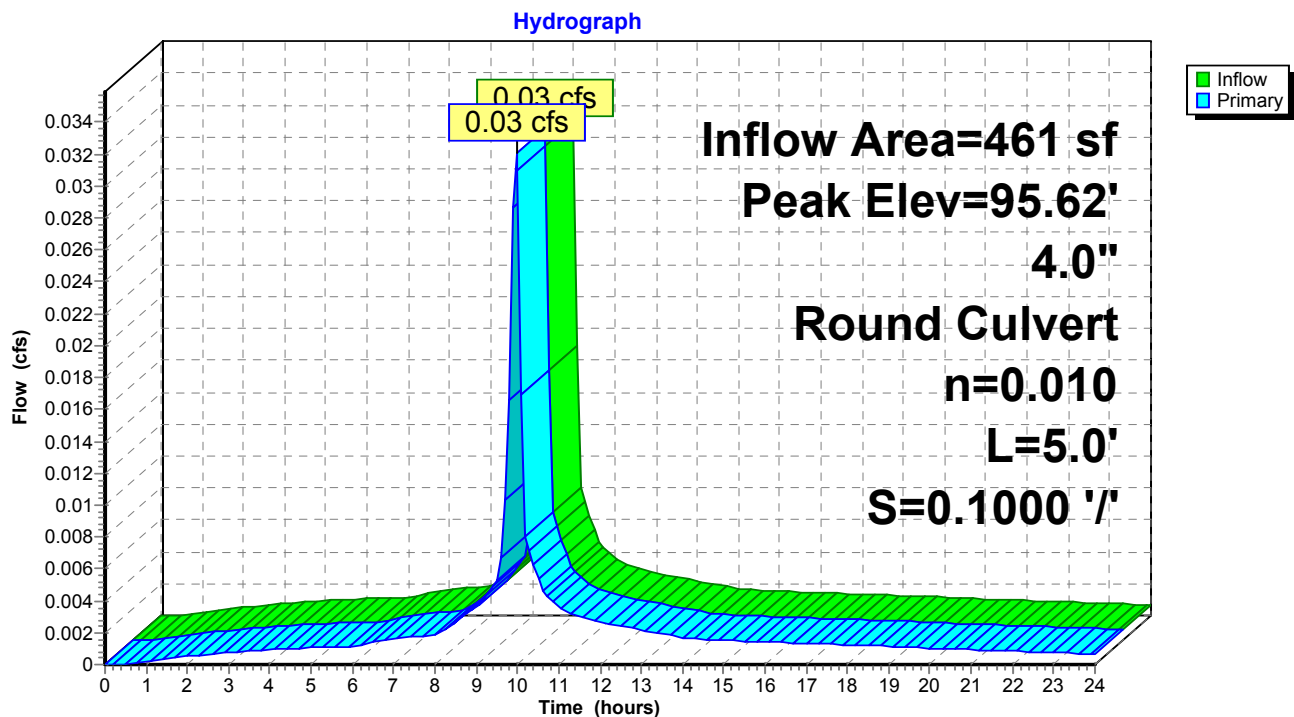
Inflow Area = 461 sf, 100.00% Impervious, Inflow Depth > 4.37" for 5-year Rainfall = 4.61" event
 Inflow = 0.03 cfs @ 9.96 hrs, Volume= 168 cf
 Outflow = 0.03 cfs @ 9.96 hrs, Volume= 168 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.03 cfs @ 9.96 hrs, Volume= 168 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.62' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.03 cfs @ 9.96 hrs HW=95.61' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.03 cfs @ 1.15 fps)

Pond 15P: Catch Basin



Summary for Pond WST-3: Water Storage Tank - 3

Inflow Area = 2,234 sf, 81.47% Impervious, Inflow Depth > 8.52" for 5-year Rainfall = 4.61" event
 Inflow = 0.15 cfs @ 9.97 hrs, Volume= 1,586 cf, Incl. 0.01 cfs Base Flow
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 93.60' @ 24.00 hrs Surf.Area= 240 sf Storage= 1,584 cf

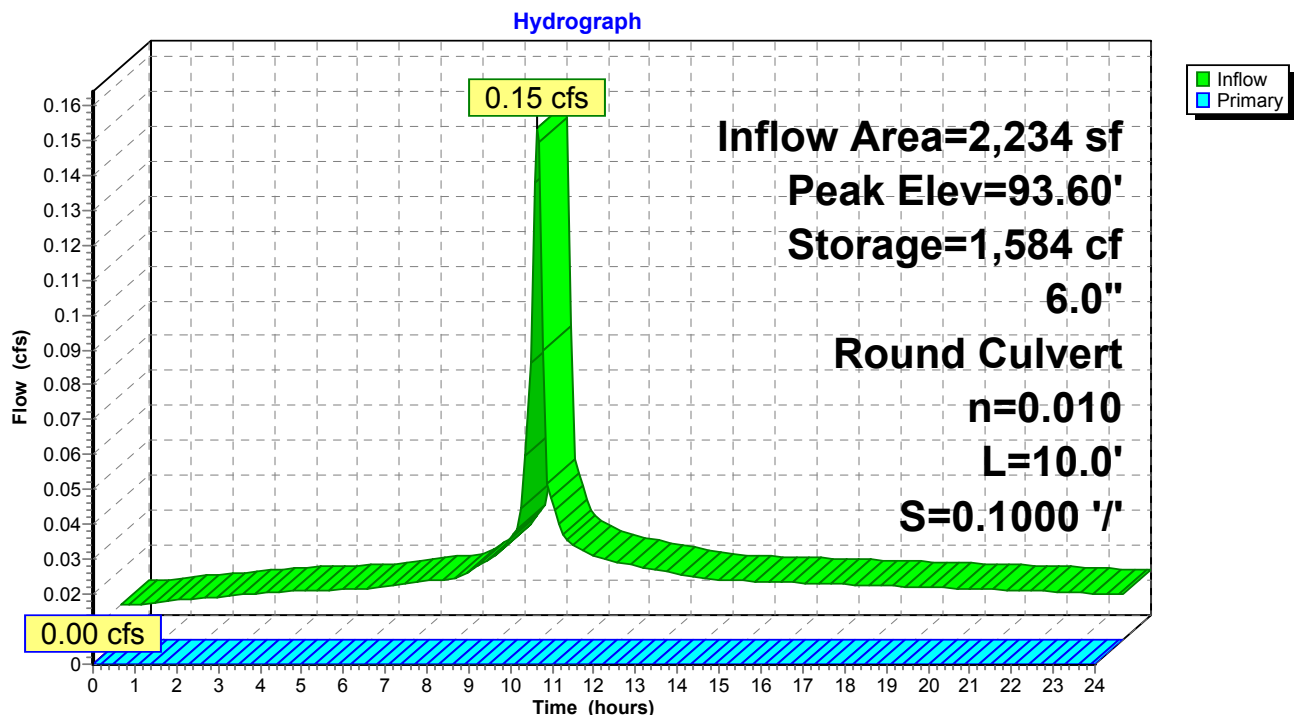
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	87.00'	1,920 cf	96.0" W x 96.0" H Box Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	94.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.50' / 93.50' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=87.01' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-3: Water Storage Tank - 3



Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: Upper West Side Yard Runoff Area=465 sf 50.11% Impervious Runoff Depth>3.80"
Flow Length=78' Slope=0.4300 '/' Tc=3.0 min CN=68/98 Runoff=0.03 cfs 147 cf

Subcatchment SC-12: Upper East Side Yard Runoff Area=363 sf 49.86% Impervious Runoff Depth>3.79"
Flow Length=65' Slope=0.3600 '/' Tc=3.0 min CN=68/98 Runoff=0.02 cfs 115 cf

Subcatchment SC-14: Residence Roof, Runoff Area=945 sf 100.00% Impervious Runoff Depth>5.31"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.08 cfs 418 cf

Subcatchment SC-15: Lower Level Patio Runoff Area=461 sf 100.00% Impervious Runoff Depth>5.31"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.04 cfs 204 cf

Subcatchment SC-17: Restored Temporary Runoff Area=1,516 sf 9.96% Impervious Runoff Depth>2.58"
Flow Length=50' Slope=0.2400 '/' Tc=3.0 min CN=68/98 Runoff=0.06 cfs 326 cf

Subcatchment SC-18: Lemonade berry Runoff Area=590 sf 10.00% Impervious Runoff Depth>0.68"
Flow Length=25' Slope=0.2400 '/' Tc=3.0 min CN=35/98 Runoff=0.00 cfs 33 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth>0.16"
Flow Length=130' Slope=0.2300 '/' Tc=3.0 min CN=35/0 Runoff=0.00 cfs 87 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.80"
Flow Length=35' Slope=1.0000 '/' Tc=3.0 min CN=48/0 Runoff=0.01 cfs 111 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>4.00"
Flow Length=35' Slope=0.2100 '/' Tc=3.0 min CN=83/98 Runoff=0.14 cfs 702 cf

Pond 11P: Catch Basin Peak Elev=95.61' Inflow=0.03 cfs 147 cf
4.0" Round Culvert n=0.010 L=31.0' S=0.0161 '/' Outflow=0.03 cfs 147 cf

Pond 12P: Catch Basin Peak Elev=95.60' Inflow=0.02 cfs 115 cf
4.0" Round Culvert n=0.010 L=35.0' S=0.0143 '/' Outflow=0.02 cfs 115 cf

Pond 14P: Catch Basin Peak Elev=96.19' Inflow=0.08 cfs 418 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.2000 '/' Outflow=0.08 cfs 418 cf

Pond 15P: Catch Basin Peak Elev=95.63' Inflow=0.04 cfs 204 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/' Outflow=0.04 cfs 204 cf

Pond WST-3: Water Storage Tank - 3 Peak Elev=94.29' Storage=1,749 cf Inflow=0.18 cfs 1,751 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.1000 '/' Outflow=0.00 cfs 0 cf

Total Runoff Area = 14,469 sf Runoff Volume = 2,144 cf Average Runoff Depth = 1.78"
83.09% Pervious = 12,023 sf 16.91% Impervious = 2,446 sf

Summary for Subcatchment SC-11: Upper West Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

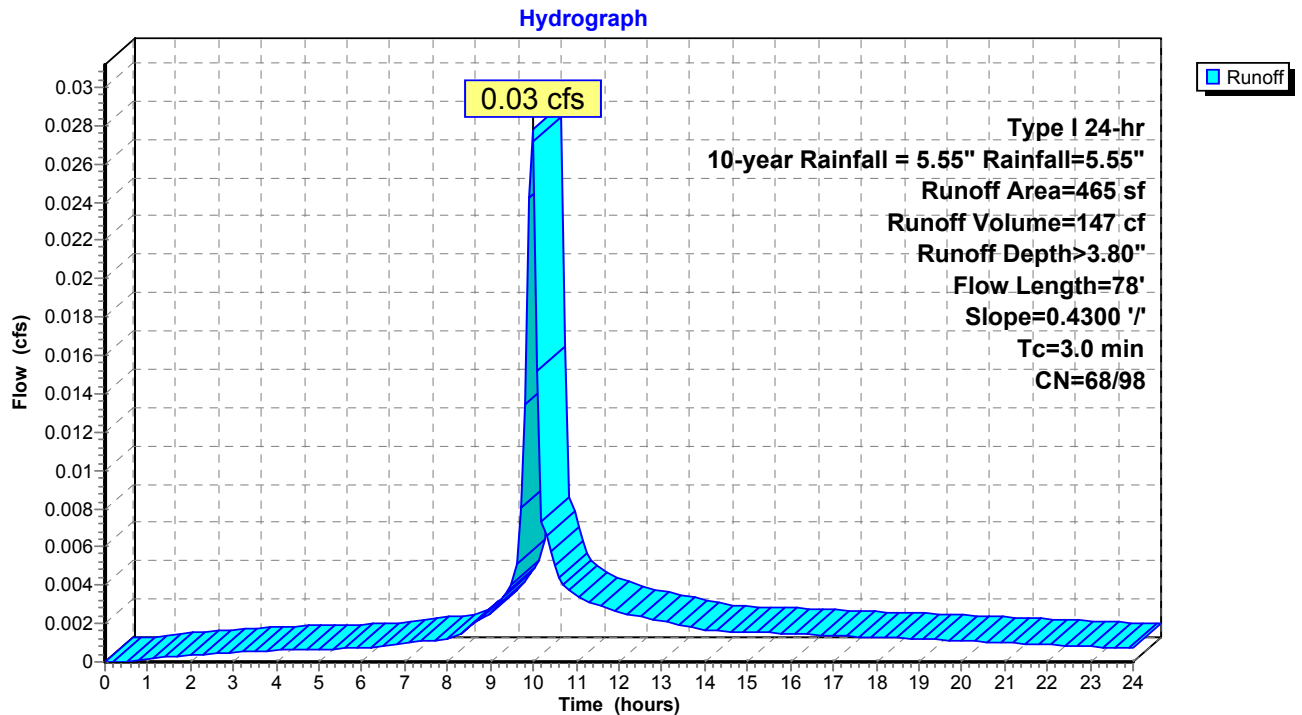
Runoff = 0.03 cfs @ 9.97 hrs, Volume= 147 cf, Depth> 3.80"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
232	68	<50% Grass cover, Poor, HSG A
233	98	Unconnected pavement, HSG A
465	83	Weighted Average
232	68	49.89% Pervious Area
233	98	50.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
1.0	78	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-11: Upper West Side Yard



Summary for Subcatchment SC-12: Upper East Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

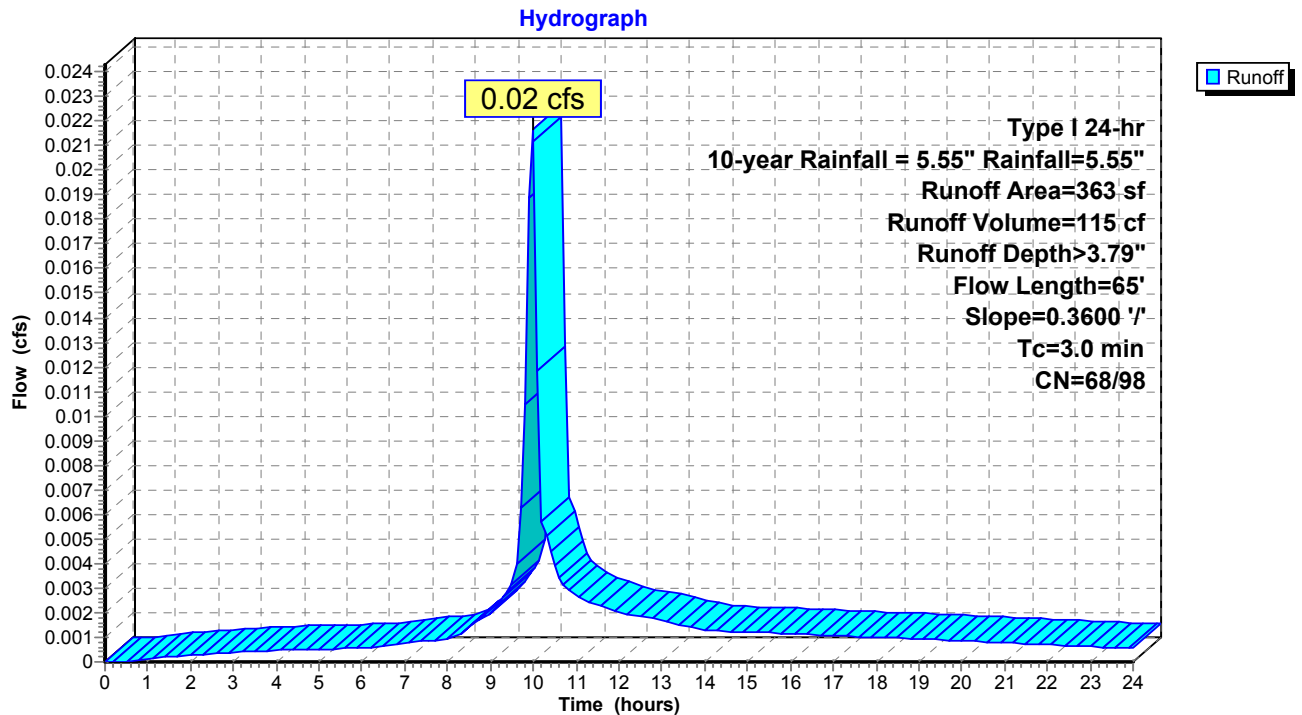
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 115 cf, Depth> 3.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
182	68	<50% Grass cover, Poor, HSG A
181	98	Unconnected pavement, HSG A
363	83	Weighted Average
182	68	50.14% Pervious Area
181	98	49.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.9	65	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-12: Upper East Side Yard



Summary for Subcatchment SC-14: Residence Roof, South Part, With Planters

[49] Hint: $T_c < 2dt$ may require smaller dt

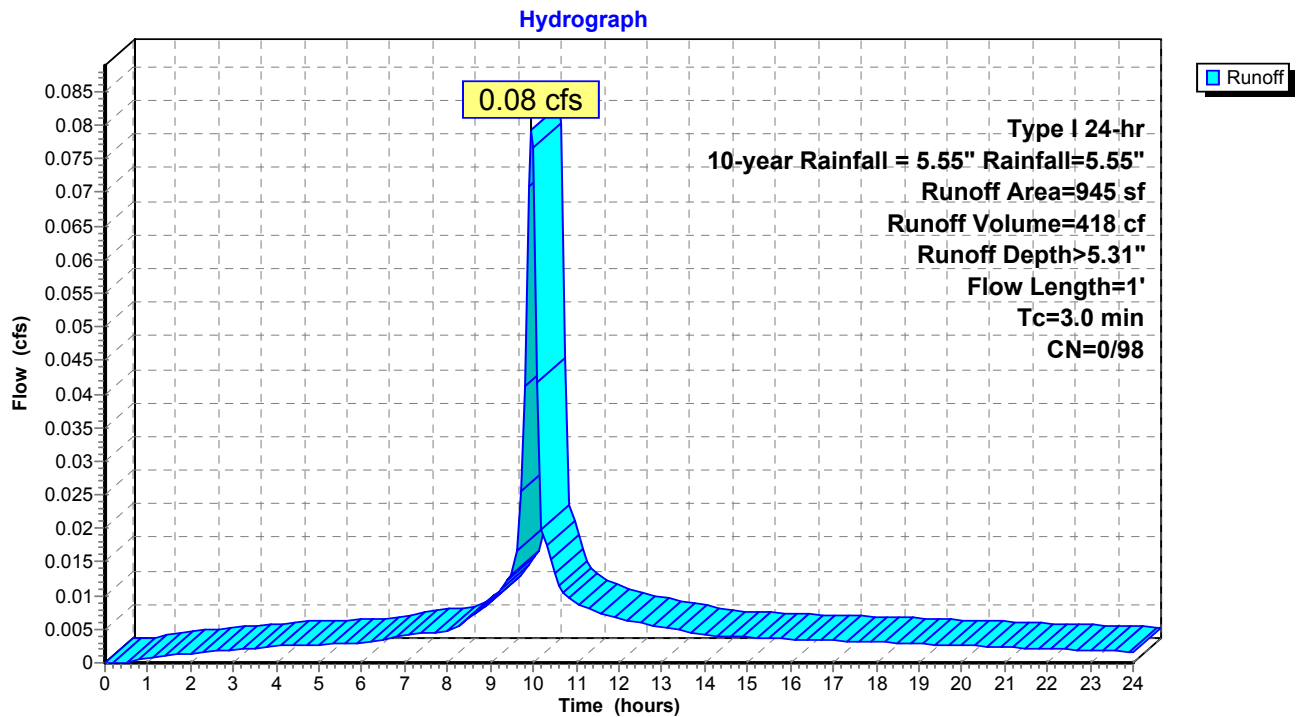
Runoff = 0.08 cfs @ 9.96 hrs, Volume= 418 cf, Depth> 5.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
945	98	Roofs, HSG A
945	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1				Total, Increased to minimum Tc = 3.0 min

Subcatchment SC-14: Residence Roof, South Part, With Planters



Summary for Subcatchment SC-15: Lower Level Patio

[49] Hint: $T_c < 2dt$ may require smaller dt

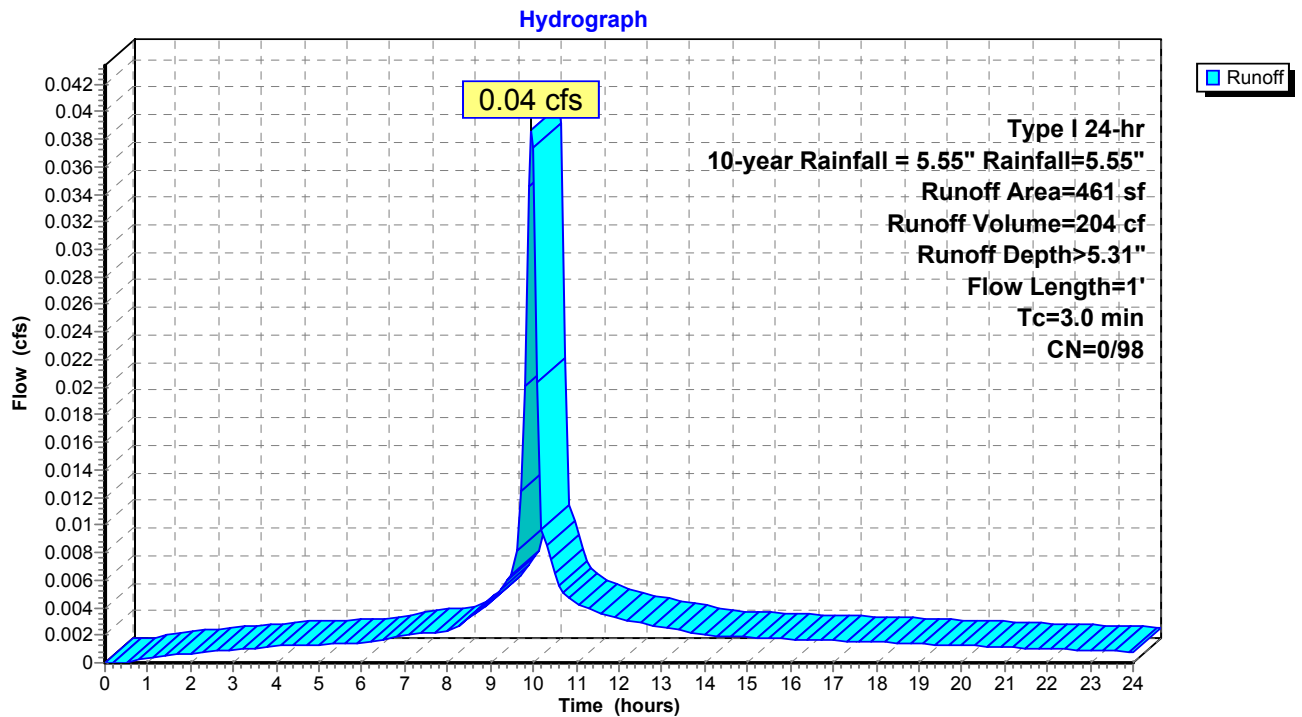
Runoff = 0.04 cfs @ 9.96 hrs, Volume= 204 cf, Depth> 5.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
461	98	Unconnected pavement, HSG A
461	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-15: Lower Level Patio



catchment SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West

[49] Hint: $T_c < 2dt$ may require smaller dt

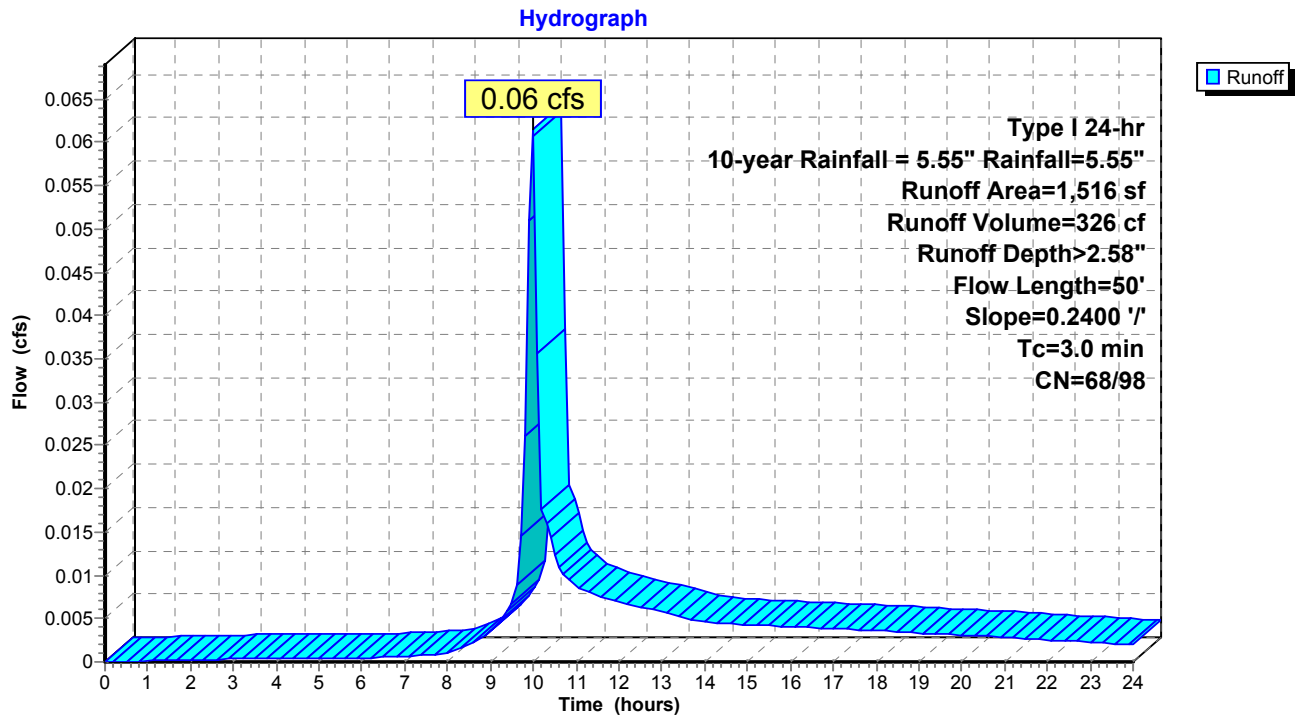
Runoff = 0.06 cfs @ 9.98 hrs, Volume= 326 cf, Depth> 2.58"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
1,365	68	<50% Grass cover, Poor, HSG A
151	98	Unconnected pavement, HSG A
1,516	71	Weighted Average
1,365	68	90.04% Pervious Area
151	98	9.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum $T_c = 3.0$ min			

ent SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West and E



Summary for Subcatchment SC-18: Lemonade berry mitigation area

[49] Hint: $T_c < 2dt$ may require smaller dt

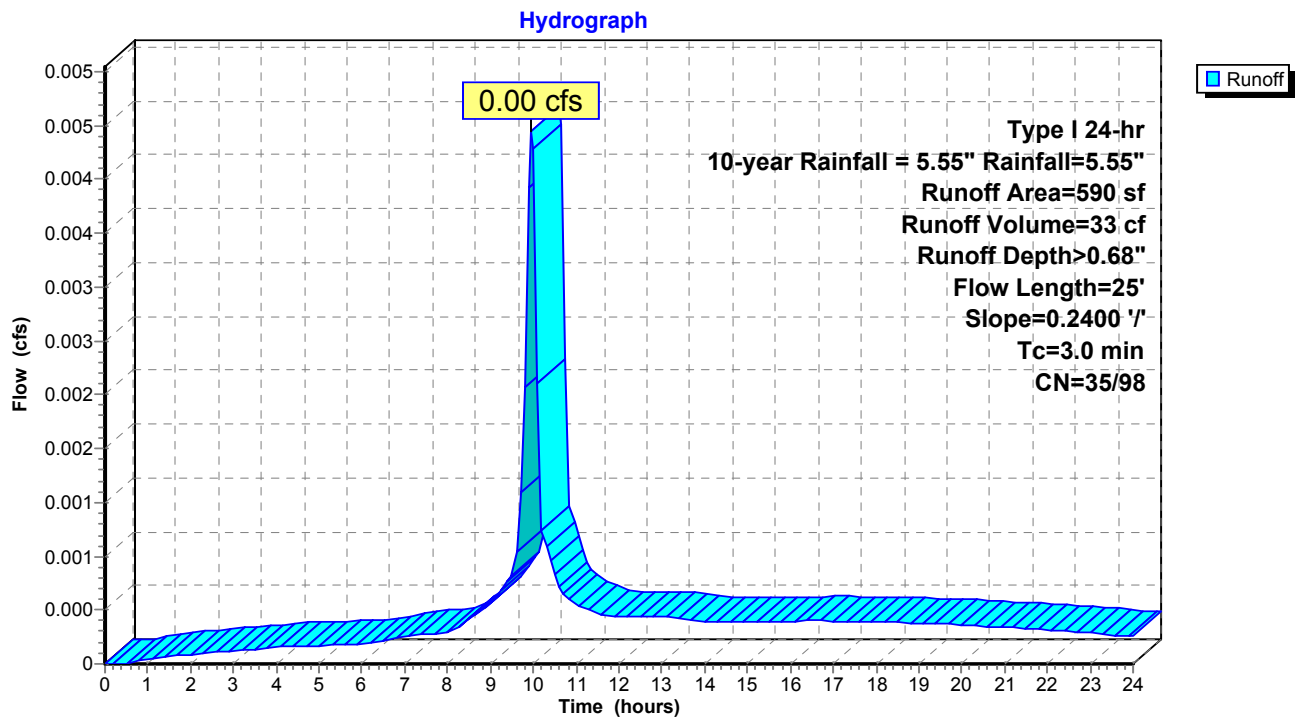
Runoff = 0.00 cfs @ 9.96 hrs, Volume= 33 cf, Depth> 0.68"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
531	35	Brush, Fair, HSG A
59	98	Unconnected pavement, HSG A
590	41	Weighted Average
531	35	90.00% Pervious Area
59	98	10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.5	25	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-18: Lemonade berry mitigation area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

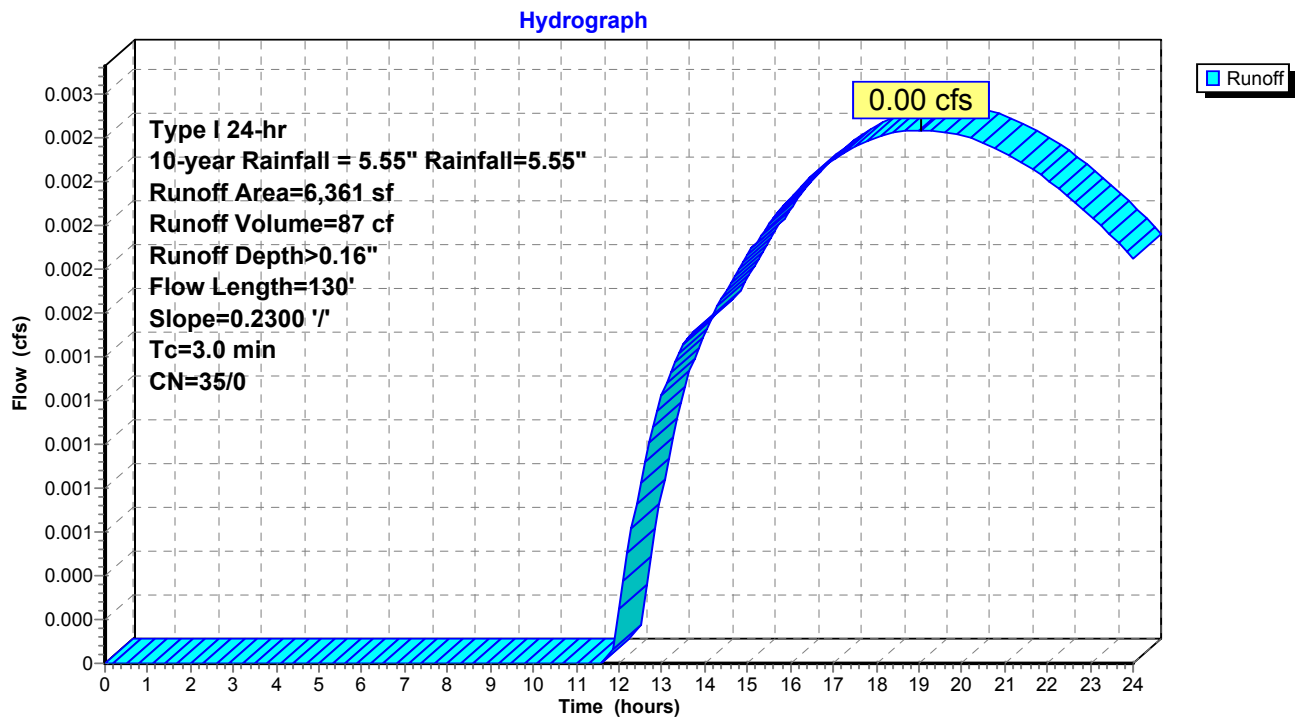
Runoff = 0.00 cfs @ 19.06 hrs, Volume= 87 cf, Depth> 0.16"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

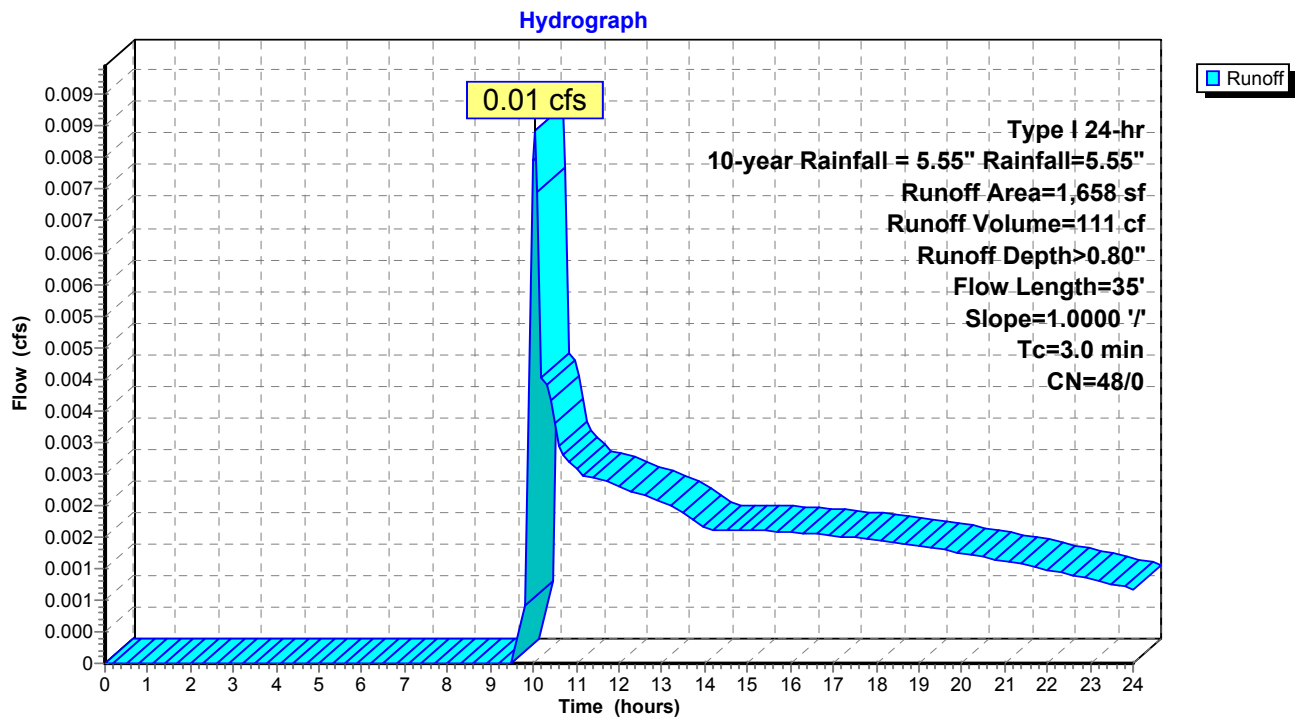
Runoff = 0.01 cfs @ 10.04 hrs, Volume= 111 cf, Depth> 0.80"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

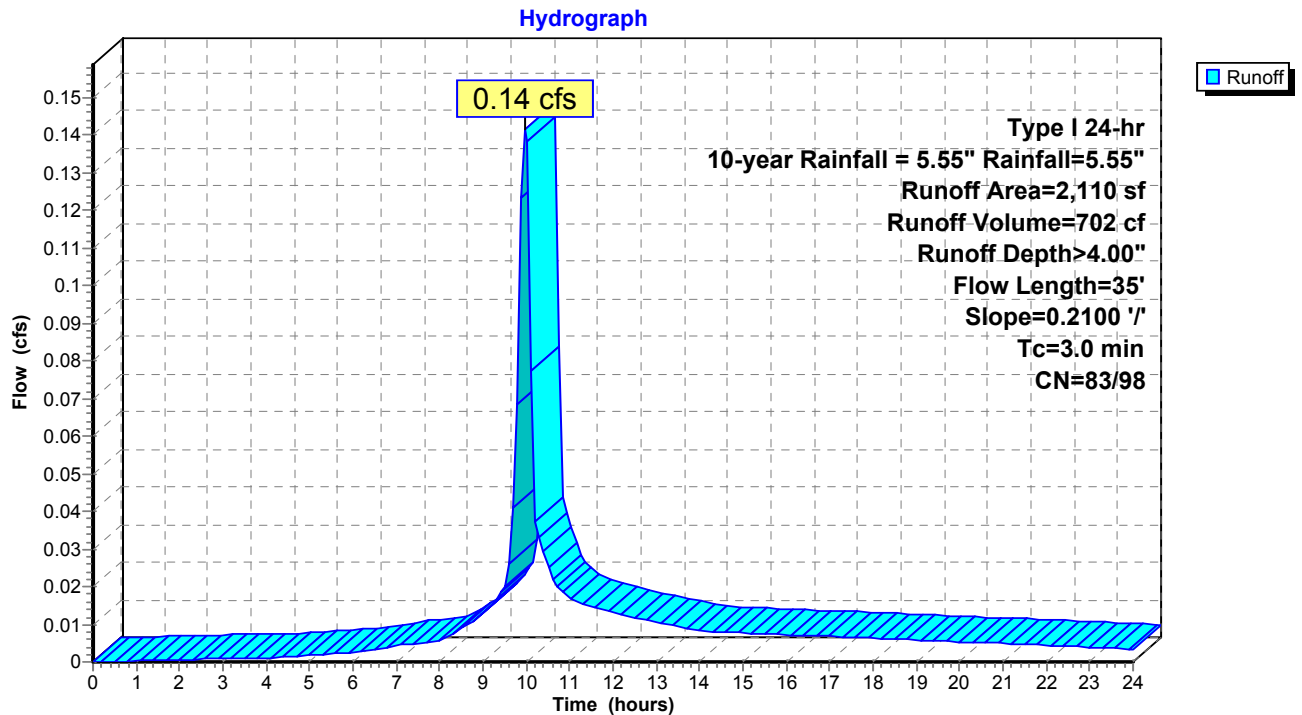
Runoff = 0.14 cfs @ 9.97 hrs, Volume= 702 cf, Depth> 4.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.7	35	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-21: Beach area



Summary for Pond 11P: Catch Basin

[57] Hint: Peaked at 95.61' (Flood elevation advised)

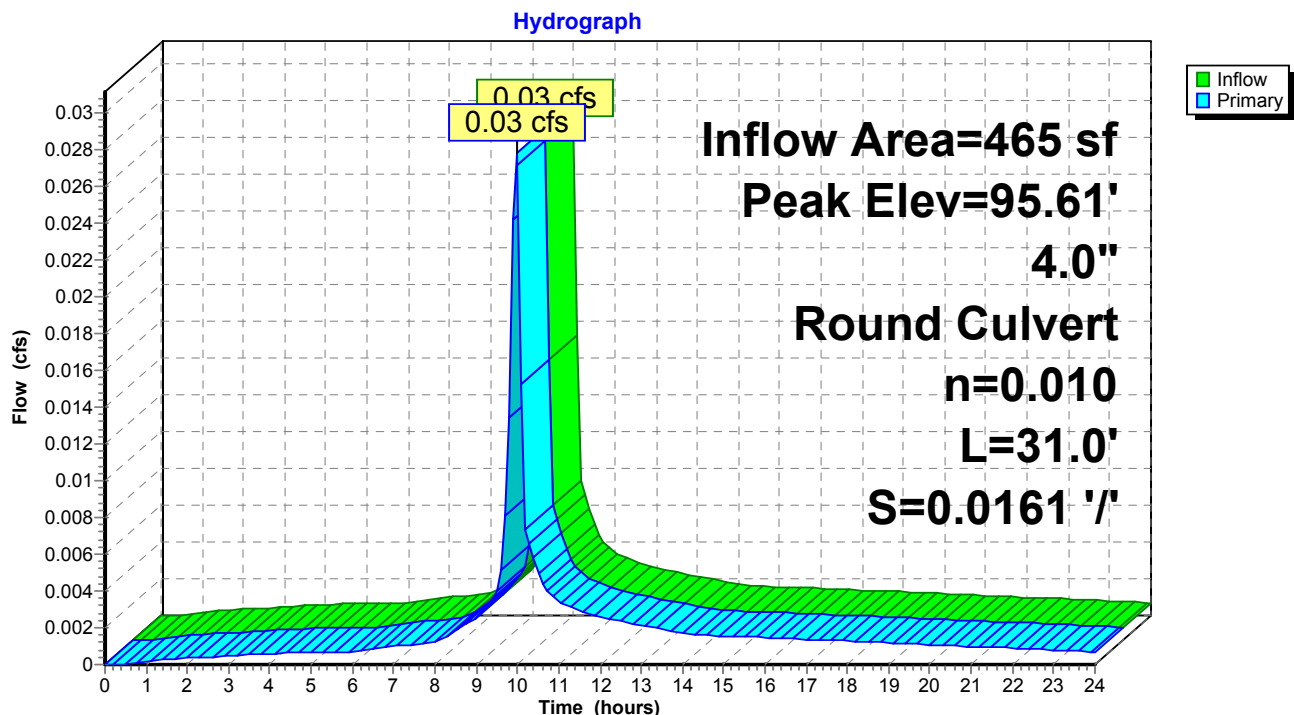
Inflow Area = 465 sf, 50.11% Impervious, Inflow Depth > 3.80" for 10-year Rainfall = 5.55" event
 Inflow = 0.03 cfs @ 9.97 hrs, Volume= 147 cf
 Outflow = 0.03 cfs @ 9.97 hrs, Volume= 147 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.03 cfs @ 9.97 hrs, Volume= 147 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.61' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0161 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.03 cfs @ 9.97 hrs HW=95.61' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.03 cfs @ 1.11 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Catch Basin

[57] Hint: Peaked at 95.60' (Flood elevation advised)

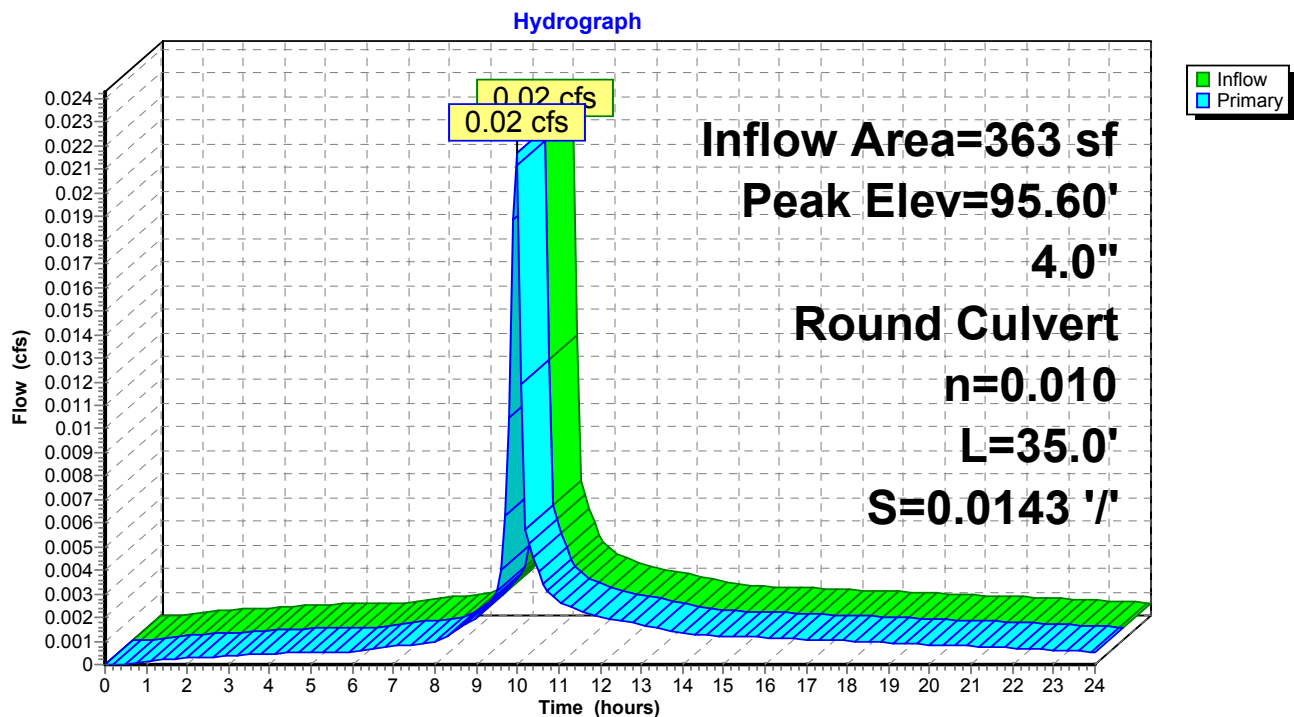
Inflow Area = 363 sf, 49.86% Impervious, Inflow Depth > 3.79" for 10-year Rainfall = 5.55" event
 Inflow = 0.02 cfs @ 9.97 hrs, Volume= 115 cf
 Outflow = 0.02 cfs @ 9.97 hrs, Volume= 115 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.97 hrs, Volume= 115 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.60' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0143 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.97 hrs HW=95.59' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.02 cfs @ 1.04 fps)

Pond 12P: Catch Basin



Summary for Pond 14P: Catch Basin

[57] Hint: Peaked at 96.19' (Flood elevation advised)

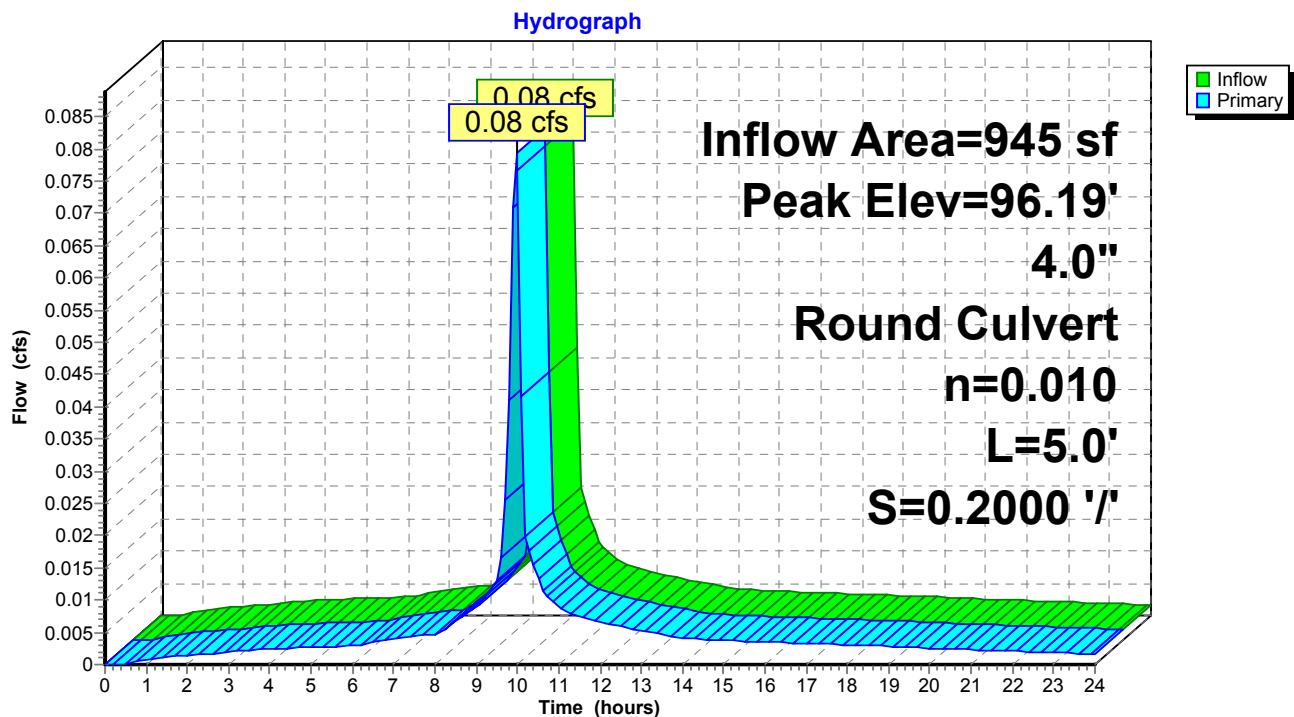
Inflow Area = 945 sf, 100.00% Impervious, Inflow Depth > 5.31" for 10-year Rainfall = 5.55" event
 Inflow = 0.08 cfs @ 9.96 hrs, Volume= 418 cf
 Outflow = 0.08 cfs @ 9.96 hrs, Volume= 418 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.08 cfs @ 9.96 hrs, Volume= 418 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 96.19' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	96.00'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.00' / 95.00' S= 0.2000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.07 cfs @ 9.96 hrs HW=96.19' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.07 cfs @ 1.47 fps)

Pond 14P: Catch Basin



Summary for Pond 15P: Catch Basin

[57] Hint: Peaked at 95.63' (Flood elevation advised)

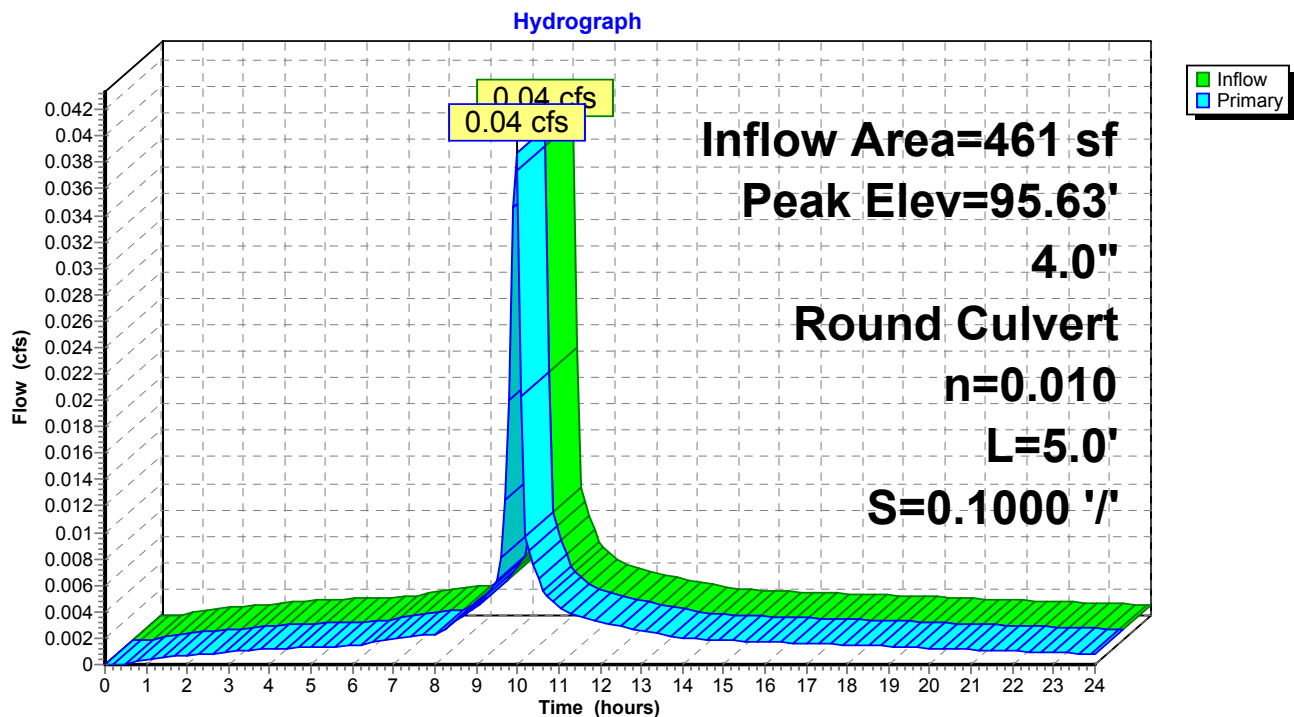
Inflow Area = 461 sf, 100.00% Impervious, Inflow Depth > 5.31" for 10-year Rainfall = 5.55" event
 Inflow = 0.04 cfs @ 9.96 hrs, Volume= 204 cf
 Outflow = 0.04 cfs @ 9.96 hrs, Volume= 204 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 9.96 hrs, Volume= 204 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.63' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.04 cfs @ 9.96 hrs HW=95.63' (Free Discharge)
 1=Culvert (Inlet Controls 0.04 cfs @ 1.21 fps)

Pond 15P: Catch Basin



Summary for Pond WST-3: Water Storage Tank - 3

Inflow Area = 2,234 sf, 81.47% Impervious, Inflow Depth > 9.41" for 10-year Rainfall = 5.55" event
 Inflow = 0.18 cfs @ 9.97 hrs, Volume= 1,751 cf, Incl. 0.01 cfs Base Flow
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 94.29' @ 24.00 hrs Surf.Area= 240 sf Storage= 1,749 cf

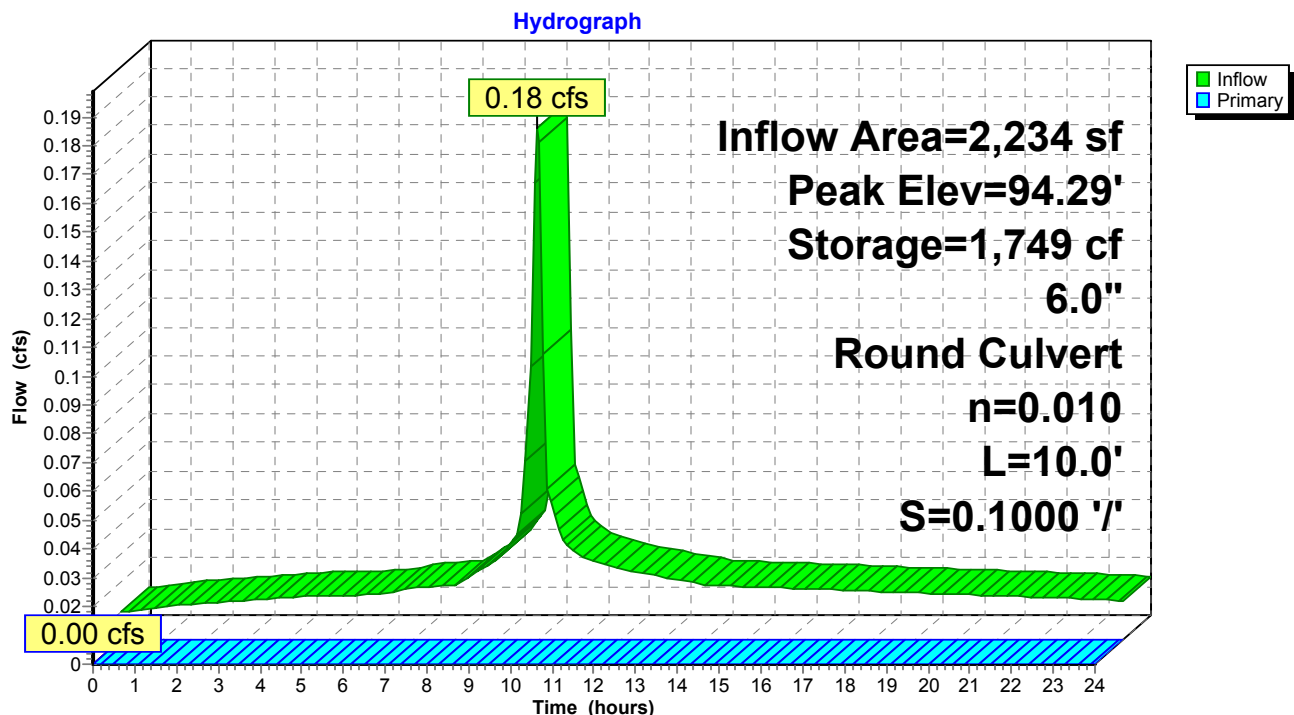
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	87.00'	1,920 cf	96.0" W x 96.0" H Box Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	94.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.50' / 93.50' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=87.01' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-3: Water Storage Tank - 3



Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: Upper West Side Yard Runoff Area=465 sf 50.11% Impervious Runoff Depth>4.82"
Flow Length=78' Slope=0.4300 '/ Tc=3.0 min CN=68/98 Runoff=0.04 cfs 187 cf

Subcatchment SC-12: Upper East Side Yard Runoff Area=363 sf 49.86% Impervious Runoff Depth>4.82"
Flow Length=65' Slope=0.3600 '/ Tc=3.0 min CN=68/98 Runoff=0.03 cfs 146 cf

Subcatchment SC-14: Residence Roof, Runoff Area=945 sf 100.00% Impervious Runoff Depth>6.47"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.10 cfs 509 cf

Subcatchment SC-15: Lower Level Patio Runoff Area=461 sf 100.00% Impervious Runoff Depth>6.47"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.05 cfs 248 cf

Subcatchment SC-17: Restored Temporary Runoff Area=1,516 sf 9.96% Impervious Runoff Depth>3.50"
Flow Length=50' Slope=0.2400 '/ Tc=3.0 min CN=68/98 Runoff=0.09 cfs 442 cf

Subcatchment SC-18: Lemonade berry Runoff Area=590 sf 10.00% Impervious Runoff Depth>1.02"
Flow Length=25' Slope=0.2400 '/ Tc=3.0 min CN=35/98 Runoff=0.01 cfs 50 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth>0.41"
Flow Length=130' Slope=0.2300 '/ Tc=3.0 min CN=35/0 Runoff=0.01 cfs 220 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>1.34"
Flow Length=35' Slope=1.0000 '/ Tc=3.0 min CN=48/0 Runoff=0.02 cfs 185 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>5.09"
Flow Length=35' Slope=0.2100 '/ Tc=3.0 min CN=83/98 Runoff=0.18 cfs 895 cf

Pond 11P: Catch Basin Peak Elev=95.62' Inflow=0.04 cfs 187 cf
4.0" Round Culvert n=0.010 L=31.0' S=0.0161 '/ Outflow=0.04 cfs 187 cf

Pond 12P: Catch Basin Peak Elev=95.61' Inflow=0.03 cfs 146 cf
4.0" Round Culvert n=0.010 L=35.0' S=0.0143 '/ Outflow=0.03 cfs 146 cf

Pond 14P: Catch Basin Peak Elev=96.22' Inflow=0.10 cfs 509 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.2000 '/ Outflow=0.10 cfs 509 cf

Pond 15P: Catch Basin Peak Elev=95.64' Inflow=0.05 cfs 248 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/ Outflow=0.05 cfs 248 cf

Pond WST-3: Water Storage Tank - 3 Peak Elev=94.56' Storage=1,814 cf Inflow=0.22 cfs 1,958 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.1000 '/ Outflow=0.02 cfs 144 cf

Total Runoff Area = 14,469 sf Runoff Volume = 2,883 cf Average Runoff Depth = 2.39"
83.09% Pervious = 12,023 sf 16.91% Impervious = 2,446 sf

Summary for Subcatchment SC-11: Upper West Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

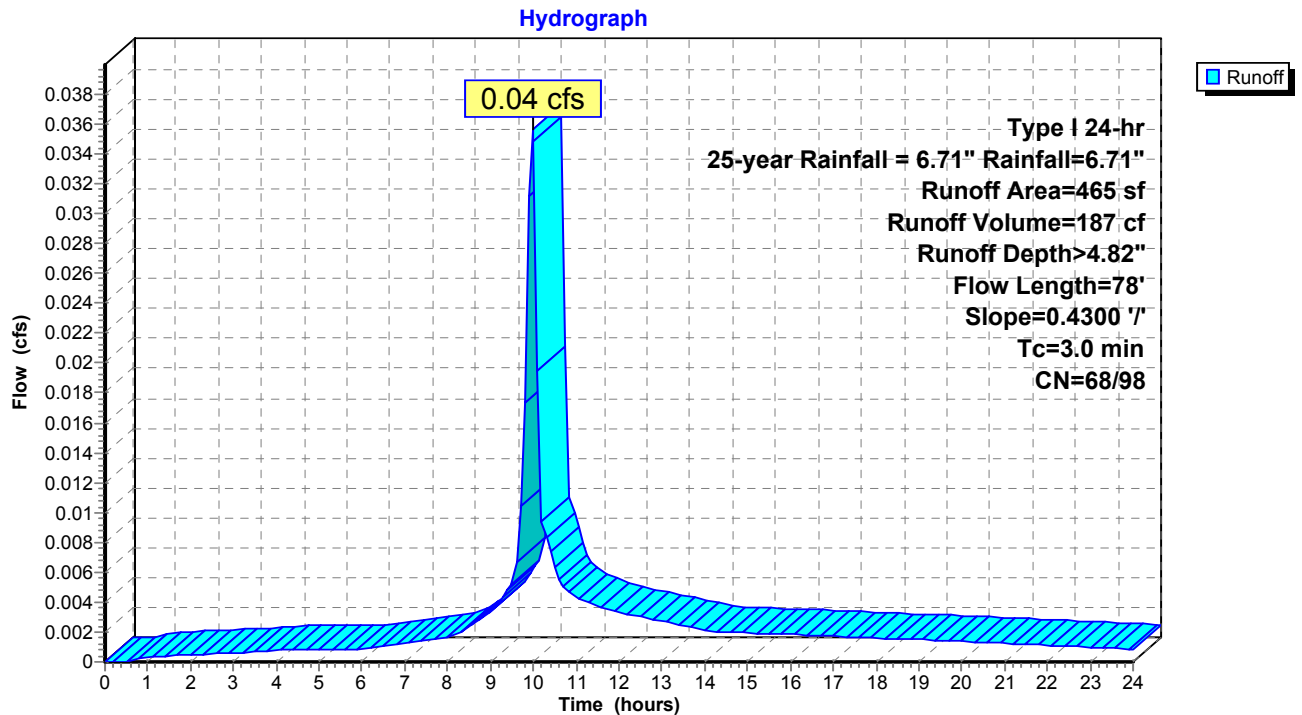
Runoff = 0.04 cfs @ 9.97 hrs, Volume= 187 cf, Depth> 4.82"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
232	68	<50% Grass cover, Poor, HSG A
233	98	Unconnected pavement, HSG A
465	83	Weighted Average
232	68	49.89% Pervious Area
233	98	50.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-11: Upper West Side Yard



Summary for Subcatchment SC-12: Upper East Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

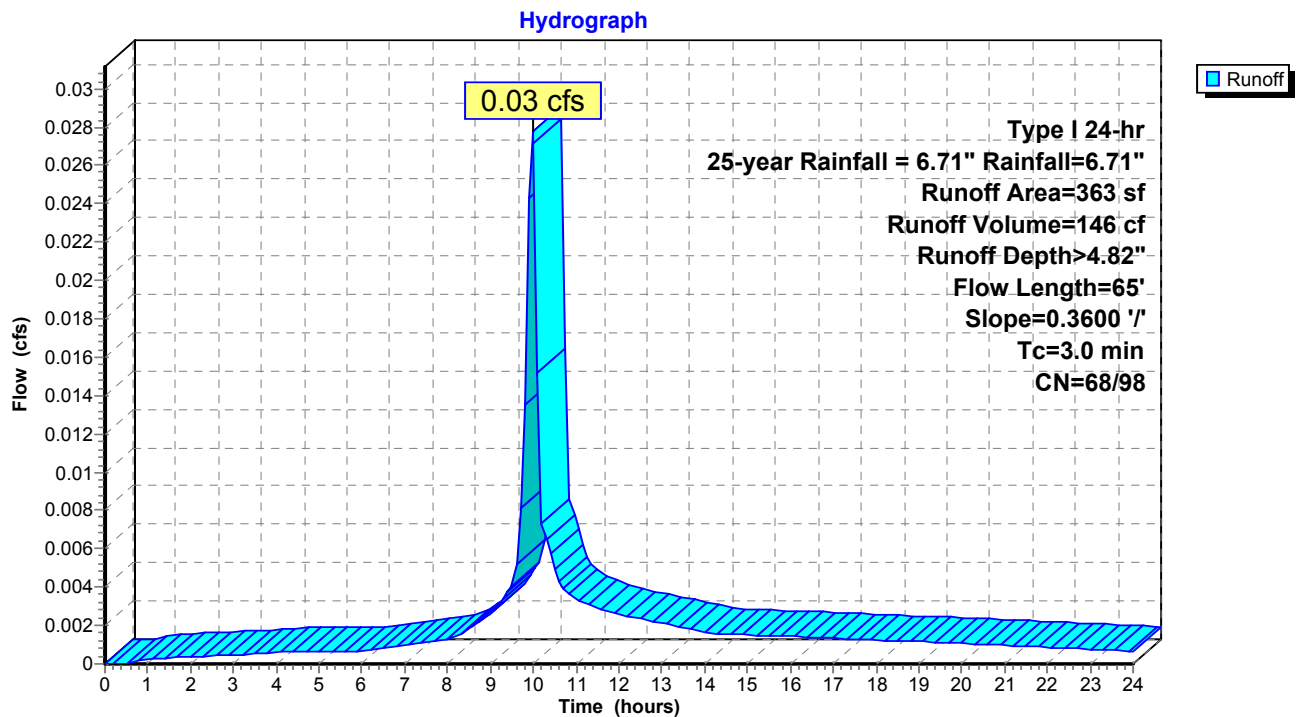
Runoff = 0.03 cfs @ 9.97 hrs, Volume= 146 cf, Depth> 4.82"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
182	68	<50% Grass cover, Poor, HSG A
181	98	Unconnected pavement, HSG A
363	83	Weighted Average
182	68	50.14% Pervious Area
181	98	49.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.9	65	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-12: Upper East Side Yard



Summary for Subcatchment SC-14: Residence Roof, South Part, With Planters

[49] Hint: $T_c < 2dt$ may require smaller dt

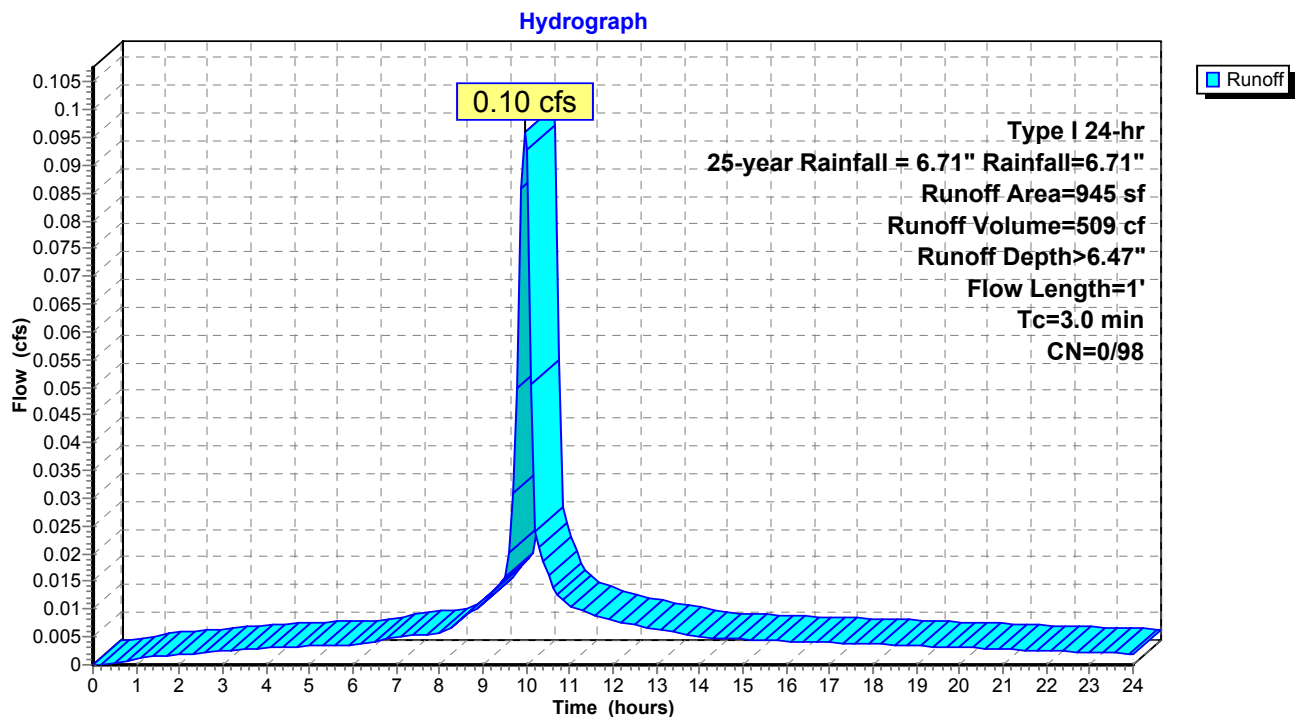
Runoff = 0.10 cfs @ 9.96 hrs, Volume= 509 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
945	98	Roofs, HSG A
945	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-14: Residence Roof, South Part, With Planters



Summary for Subcatchment SC-15: Lower Level Patio

[49] Hint: $T_c < 2dt$ may require smaller dt

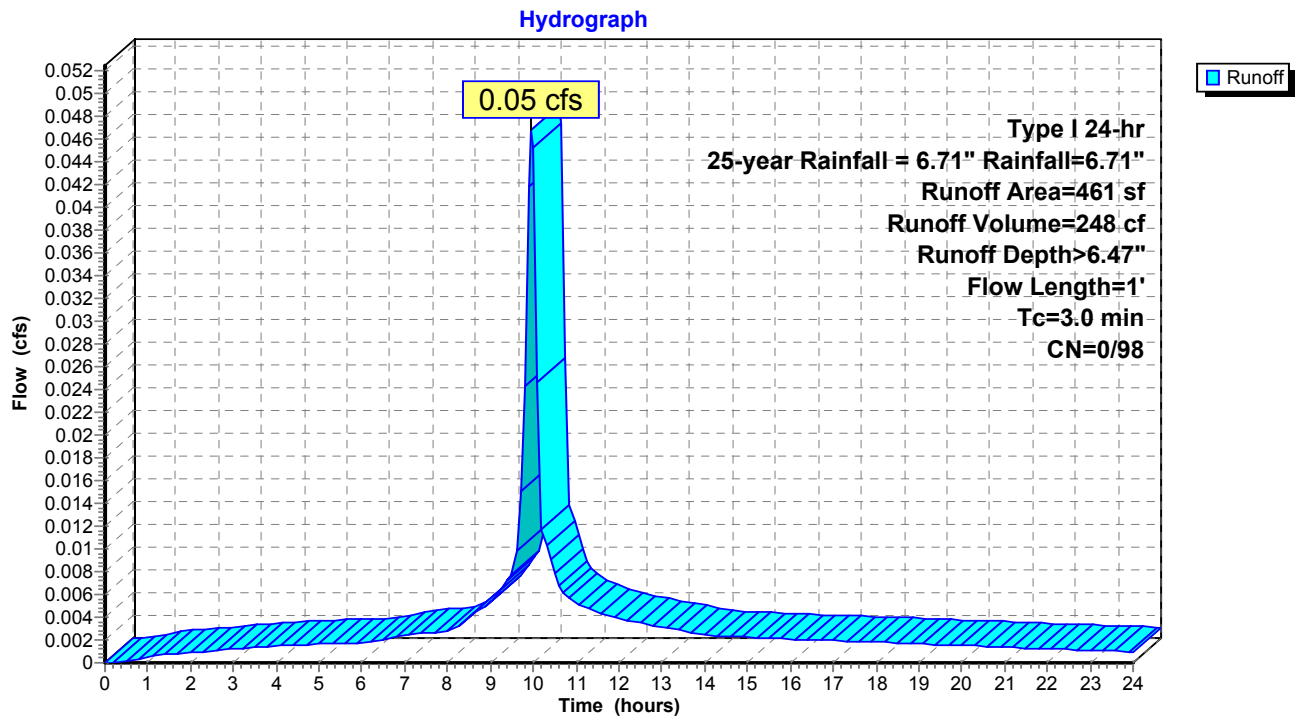
Runoff = 0.05 cfs @ 9.96 hrs, Volume= 248 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
461	98	Unconnected pavement, HSG A
461	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-15: Lower Level Patio



Catchment SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West

[49] Hint: $T_c < 2dt$ may require smaller dt

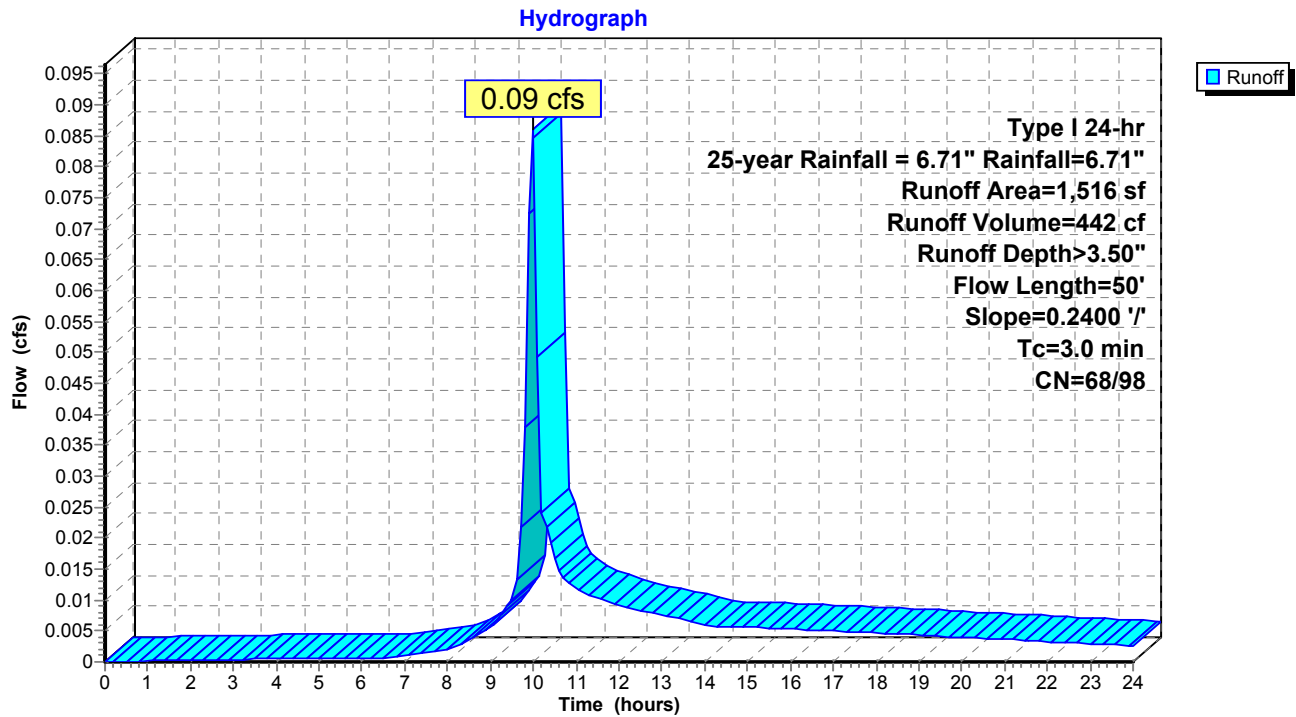
Runoff = 0.09 cfs @ 9.98 hrs, Volume= 442 cf, Depth> 3.50"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt = 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,365	68	<50% Grass cover, Poor, HSG A
151	98	Unconnected pavement, HSG A
1,516	71	Weighted Average
1,365	68	90.04% Pervious Area
151	98	9.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum Tc = 3.0 min			

ent SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West and E



Summary for Subcatchment SC-18: Lemonade berry mitigation area

[49] Hint: $T_c < 2dt$ may require smaller dt

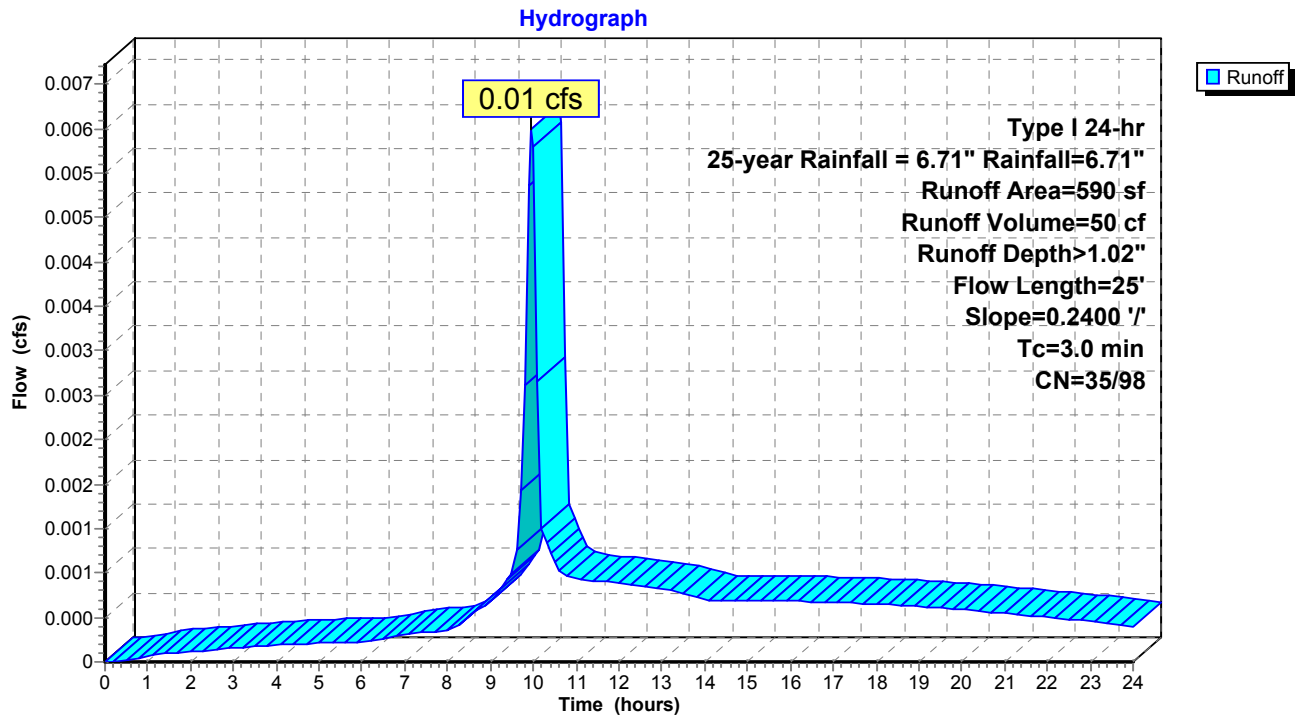
Runoff = 0.01 cfs @ 9.96 hrs, Volume= 50 cf, Depth> 1.02"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
531	35	Brush, Fair, HSG A
59	98	Unconnected pavement, HSG A
590	41	Weighted Average
531	35	90.00% Pervious Area
59	98	10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.5	25	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-18: Lemonade berry mitigation area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

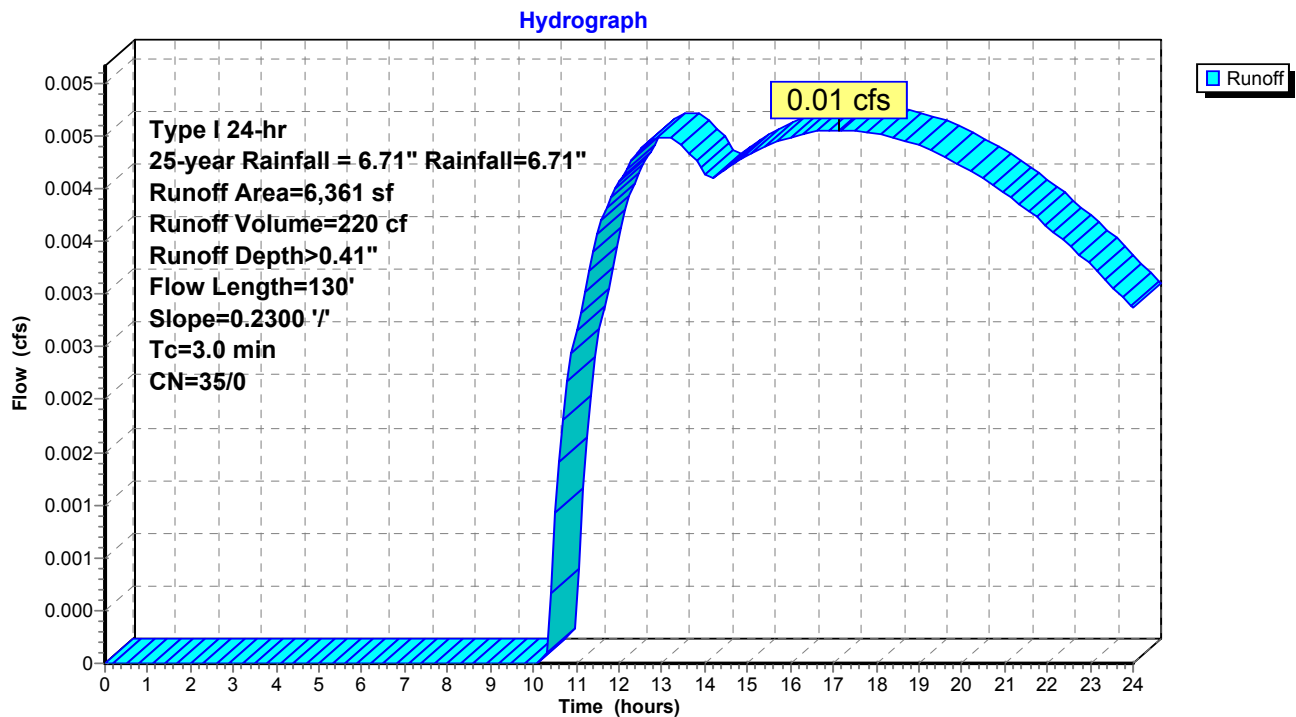
Runoff = 0.01 cfs @ 17.16 hrs, Volume= 220 cf, Depth> 0.41"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

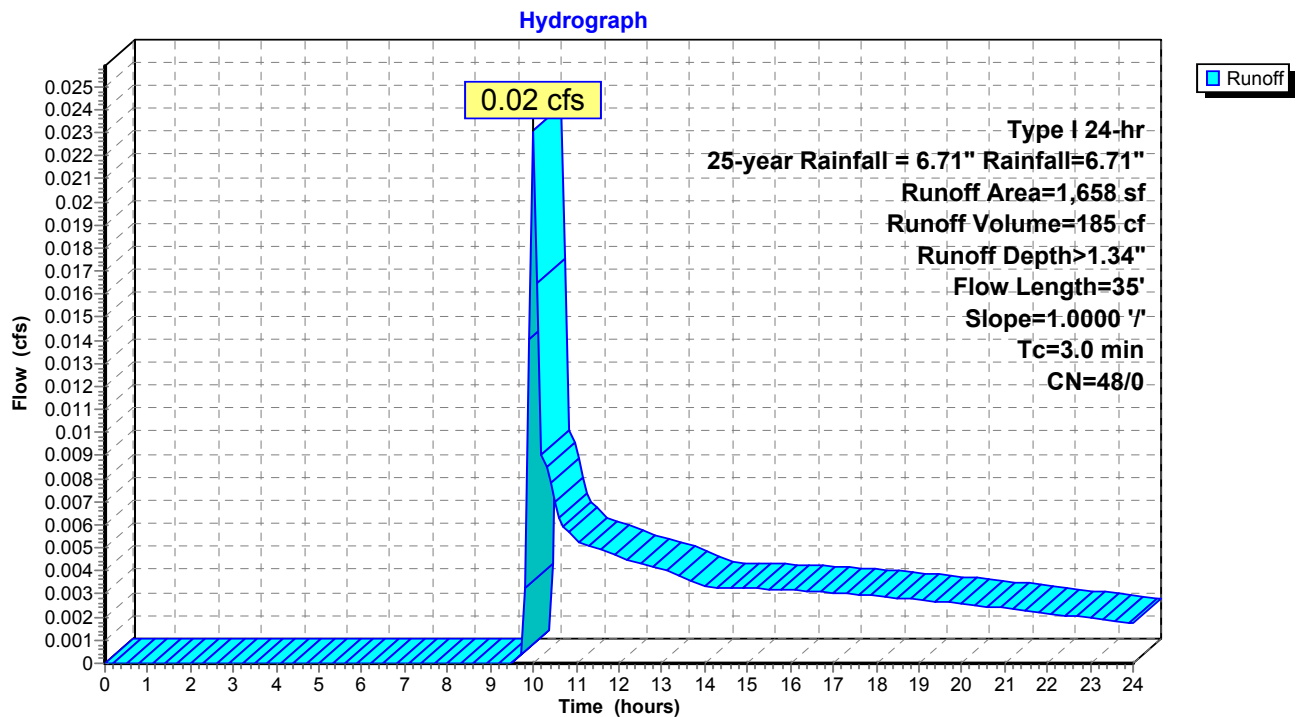
Runoff = 0.02 cfs @ 10.01 hrs, Volume= 185 cf, Depth> 1.34"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

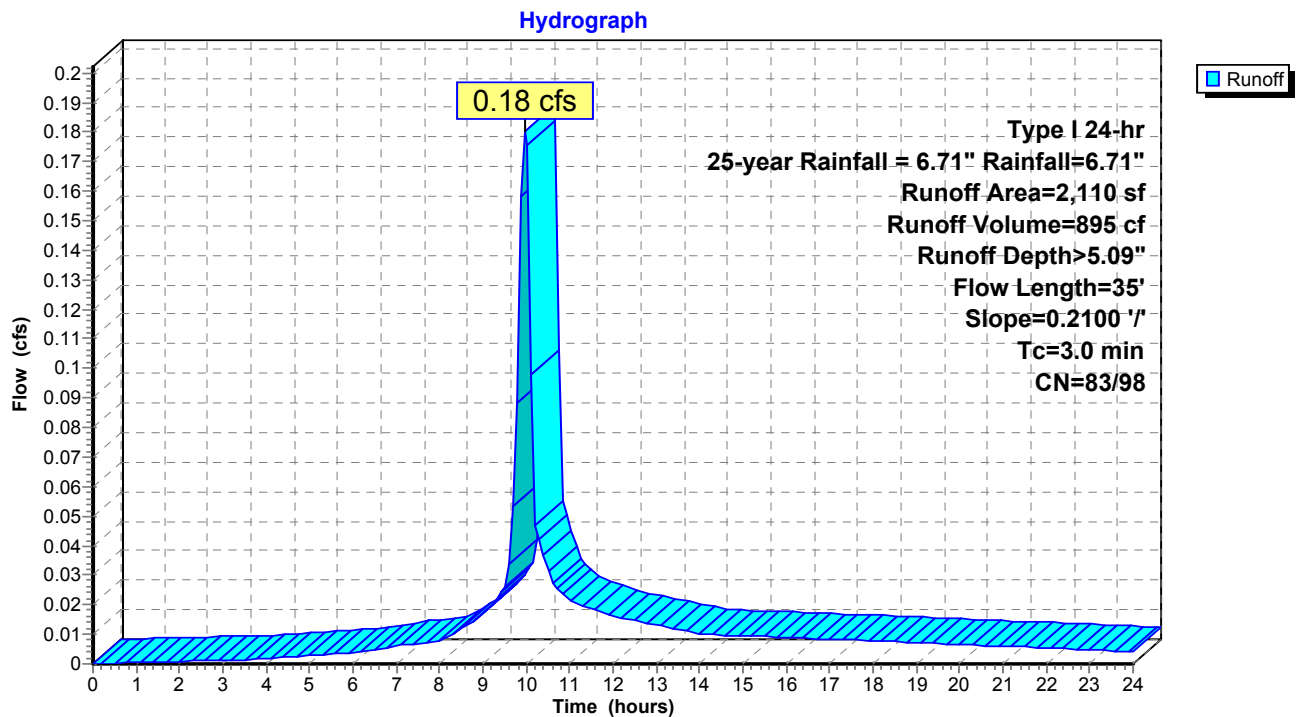
Runoff = 0.18 cfs @ 9.97 hrs, Volume= 895 cf, Depth> 5.09"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.7	35	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-21: Beach area



Summary for Pond 11P: Catch Basin

[57] Hint: Peaked at 95.62' (Flood elevation advised)

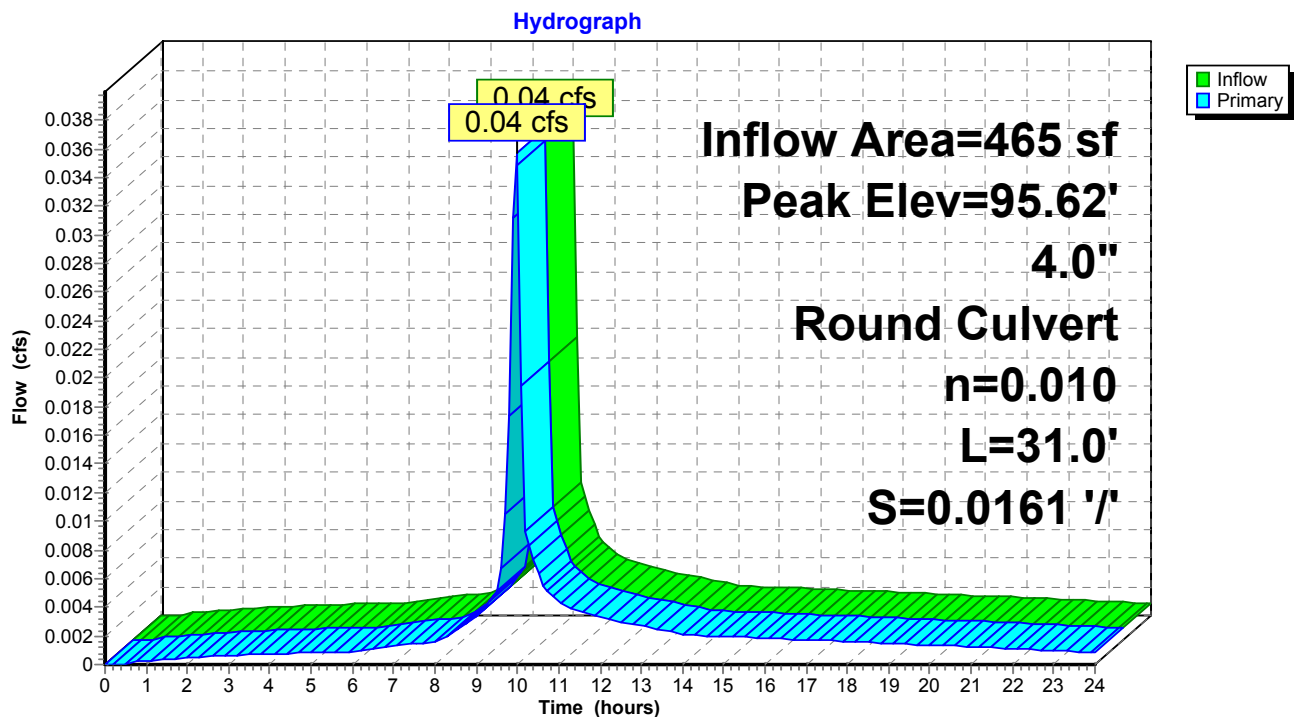
Inflow Area = 465 sf, 50.11% Impervious, Inflow Depth > 4.82" for 25-year Rainfall = 6.71" event
 Inflow = 0.04 cfs @ 9.97 hrs, Volume= 187 cf
 Outflow = 0.04 cfs @ 9.97 hrs, Volume= 187 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 9.97 hrs, Volume= 187 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.62' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0161 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.03 cfs @ 9.97 hrs HW=95.62' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.03 cfs @ 1.18 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Catch Basin

[57] Hint: Peaked at 95.61' (Flood elevation advised)

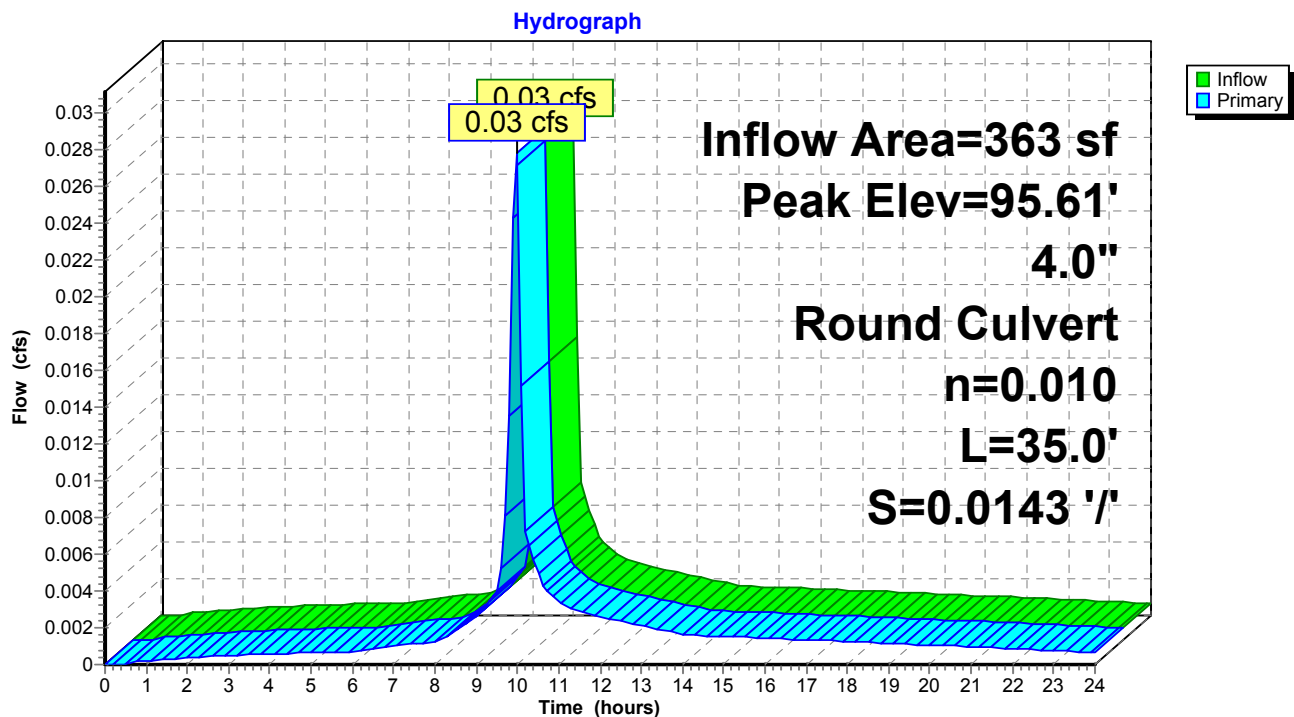
Inflow Area = 363 sf, 49.86% Impervious, Inflow Depth > 4.82" for 25-year Rainfall = 6.71" event
 Inflow = 0.03 cfs @ 9.97 hrs, Volume= 146 cf
 Outflow = 0.03 cfs @ 9.97 hrs, Volume= 146 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.03 cfs @ 9.97 hrs, Volume= 146 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.61' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0143 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.03 cfs @ 9.97 hrs HW=95.61' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.03 cfs @ 1.11 fps)

Pond 12P: Catch Basin



Summary for Pond 14P: Catch Basin

[57] Hint: Peaked at 96.22' (Flood elevation advised)

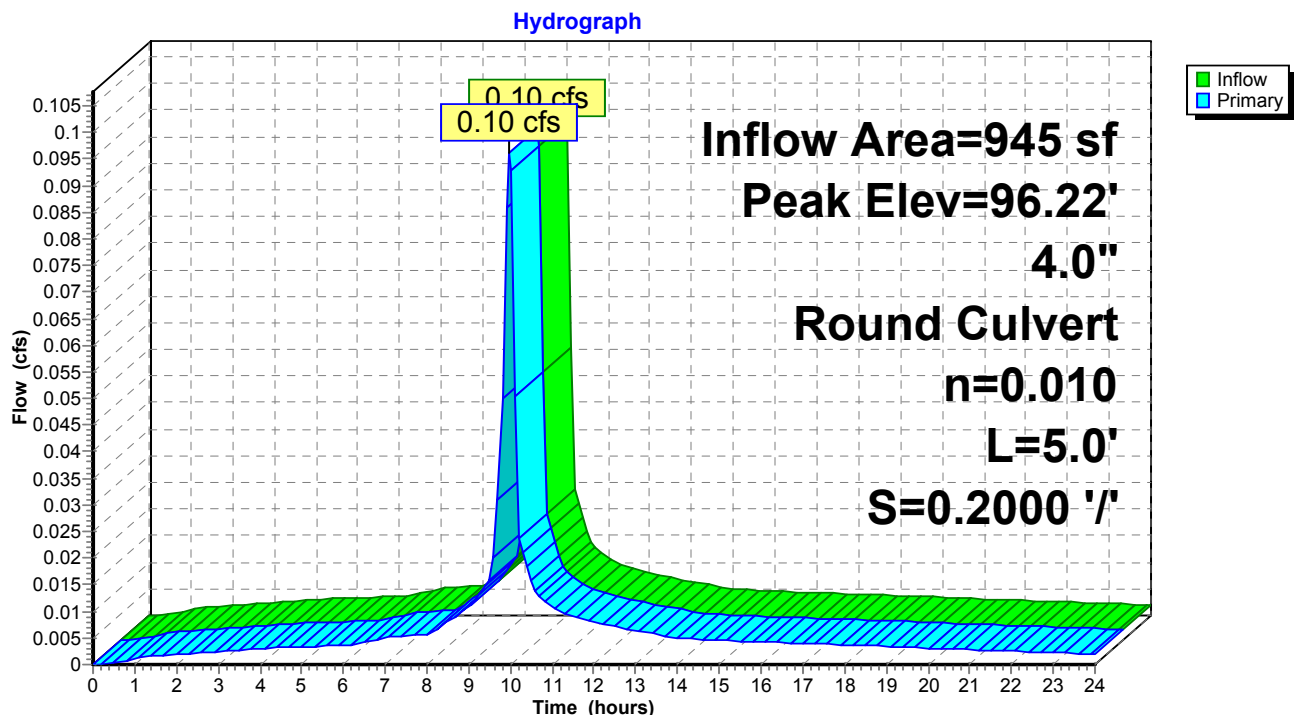
Inflow Area = 945 sf, 100.00% Impervious, Inflow Depth > 6.47" for 25-year Rainfall = 6.71" event
 Inflow = 0.10 cfs @ 9.96 hrs, Volume= 509 cf
 Outflow = 0.10 cfs @ 9.96 hrs, Volume= 509 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.10 cfs @ 9.96 hrs, Volume= 509 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 96.22' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	96.00'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.00' / 95.00' S= 0.2000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.09 cfs @ 9.96 hrs HW=96.21' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.09 cfs @ 1.56 fps)

Pond 14P: Catch Basin



Summary for Pond 15P: Catch Basin

[57] Hint: Peaked at 95.64' (Flood elevation advised)

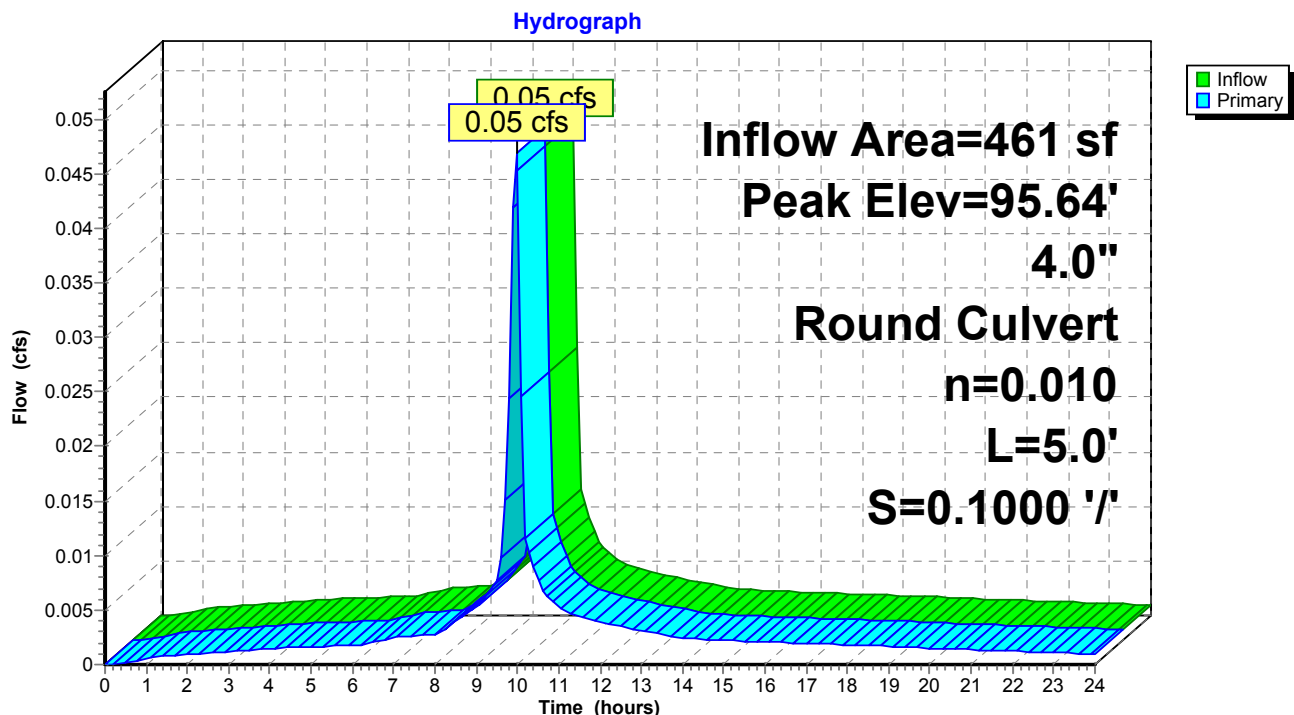
Inflow Area = 461 sf, 100.00% Impervious, Inflow Depth > 6.47" for 25-year Rainfall = 6.71" event
 Inflow = 0.05 cfs @ 9.96 hrs, Volume= 248 cf
 Outflow = 0.05 cfs @ 9.96 hrs, Volume= 248 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 9.96 hrs, Volume= 248 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.64' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.04 cfs @ 9.96 hrs HW=95.64' (Free Discharge)
 1=Culvert (Inlet Controls 0.04 cfs @ 1.27 fps)

Pond 15P: Catch Basin



Summary for Pond WST-3: Water Storage Tank - 3

Inflow Area = 2,234 sf, 81.47% Impervious, Inflow Depth > 10.52" for 25-year Rainfall = 6.71" event
 Inflow = 0.22 cfs @ 9.97 hrs, Volume= 1,958 cf, Incl. 0.01 cfs Base Flow
 Outflow = 0.02 cfs @ 22.15 hrs, Volume= 144 cf, Atten= 93%, Lag= 731.3 min
 Primary = 0.02 cfs @ 22.15 hrs, Volume= 144 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 94.56' @ 22.15 hrs Surf.Area= 240 sf Storage= 1,814 cf

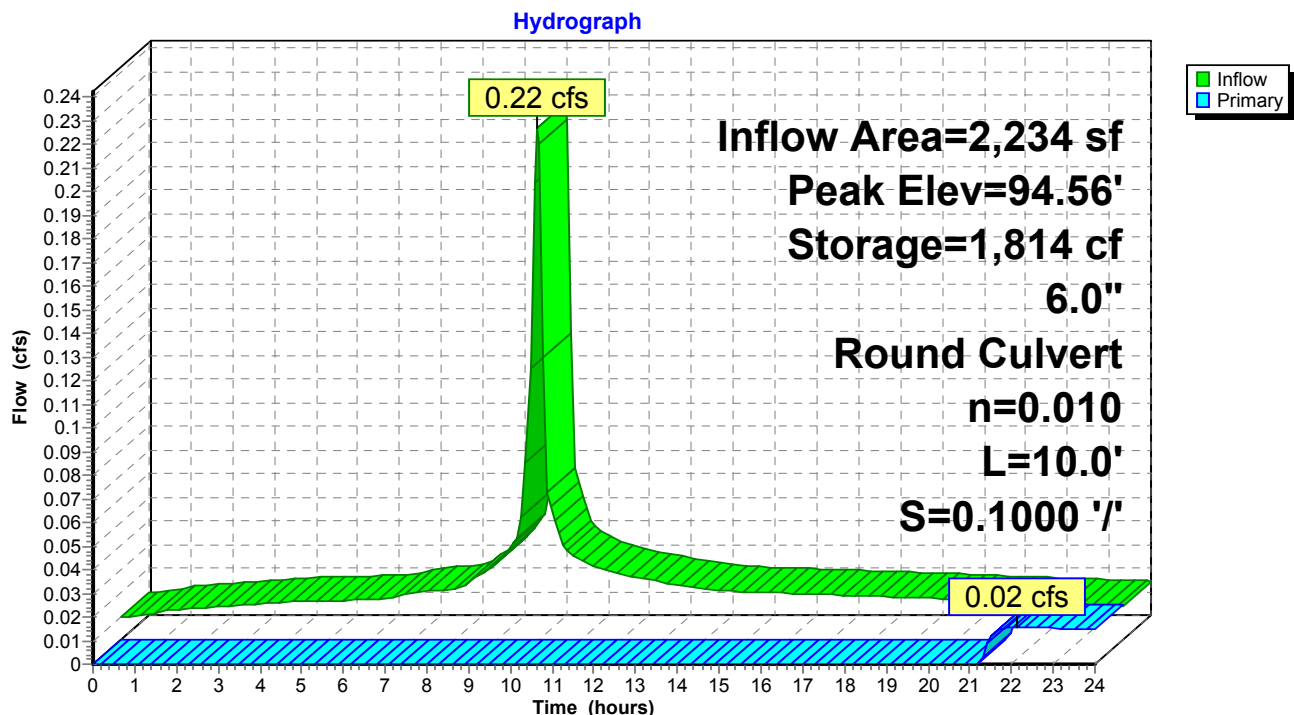
Plug-Flow detention time= 1,266.1 min calculated for 142 cf (7% of inflow)
 Center-of-Mass det. time= 653.0 min (1,362.8 - 709.8)

Volume	Invert	Avail.Storage	Storage Description
#1	87.00'	1,920 cf	96.0" W x 96.0" H Box Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	94.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.50' / 93.50' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

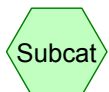
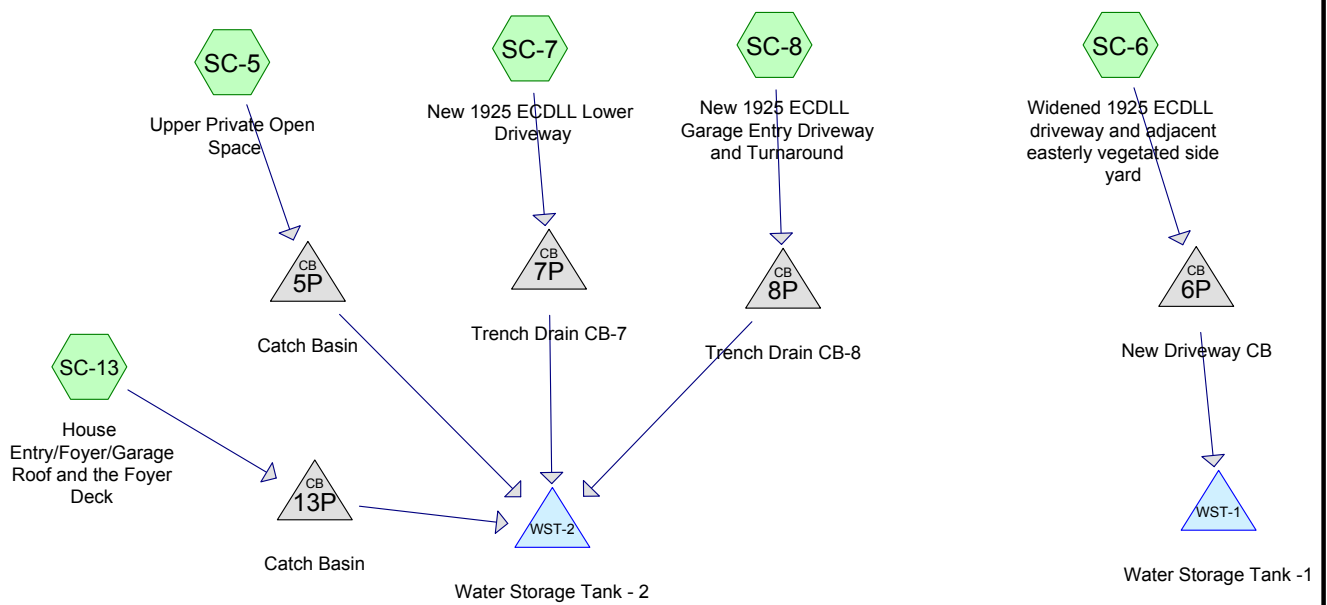
Primary OutFlow Max=0.01 cfs @ 22.15 hrs HW=94.56' (Free Discharge)
 1=Culvert (Inlet Controls 0.01 cfs @ 0.83 fps)

Pond WST-3: Water Storage Tank - 3



APPENDIX G

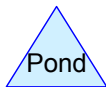
HydroCAD Quantitative Analysis for Post-Project Completion (Upper Areas, Lower Areas and Areas to 1921 Storm Drain) 2-Year/5-Year, 10-Year, and 25-Year/24-Hour Rainfall Events at 1925 ECDLL, Santa Barbara



Subcat



Reach



Pond



Link

Routing Diagram for 1925 ECDLL_Post Construction Analysis_2015-02-26_Upper

Prepared by CSA, Printed 3/31/2015

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1925 ECDLL_Post Construction Analysis_2015-02-26_Upper

Prepared by CSA

Printed 3/31/2015

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
1,159	68	<50% Grass cover, Poor, HSG A (SC-5, SC-6)
4,196	98	Impervious (SC-13, SC-6, SC-7, SC-8)
5,355	92	TOTAL AREA

1925 ECDLL_Post Construction Analysis_2015-02-26_Upper

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
1,159	HSG A	SC-5, SC-6
0	HSG B	
0	HSG C	
0	HSG D	
4,196	Other	SC-13, SC-6, SC-7, SC-8
5,355		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subo Num
1,159	0	0	0	0	1,159	<50% Grass cover, Poor	
0	0	0	0	4,196	4,196	Impervious	
1,159	0	0	0	4,196	5,355	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	5P	127.00	119.00	30.0	0.2667	0.010	4.0	0.0	0.0
2	6P	128.50	128.00	5.0	0.1000	0.010	4.0	0.0	0.0
3	7P	121.50	119.00	10.0	0.2500	0.010	4.0	0.0	0.0
4	8P	119.50	119.00	20.0	0.0250	0.010	4.0	0.0	0.0
5	13P	119.00	118.50	10.0	0.0500	0.010	4.0	0.0	0.0
6	WST-1	127.50	127.00	10.0	0.0500	0.010	6.0	0.0	0.0
7	WST-2	118.50	117.50	10.0	0.1000	0.010	6.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
 Runoff by SBUH method, Split Pervious/Imperv.
 Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-13: House Runoff Area=1,245 sf 100.00% Impervious Runoff Depth>0.79"
 Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.02 cfs 82 cf

Subcatchment SC-5: Upper Private Open Runoff Area=884 sf 0.00% Impervious Runoff Depth>0.00"
 Flow Length=30' Slope=0.1000 '/' Tc=3.0 min CN=68/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-6: Widened 1925 ECDLL Runoff Area=1,615 sf 82.97% Impervious Runoff Depth>0.66"
 Flow Length=160' Slope=0.0700 '/' Tc=3.0 min CN=68/98 Runoff=0.02 cfs 88 cf

Subcatchment SC-7: New 1925 ECDLL Runoff Area=653 sf 100.00% Impervious Runoff Depth>0.79"
 Flow Length=40' Slope=0.1600 '/' Tc=3.0 min CN=0/98 Runoff=0.01 cfs 43 cf

Subcatchment SC-8: New 1925 ECDLL Runoff Area=958 sf 100.00% Impervious Runoff Depth>0.79"
 Flow Length=30' Slope=0.0800 '/' Tc=3.0 min CN=0/98 Runoff=0.01 cfs 63 cf

Pond 5P: Catch Basin Peak Elev=127.00' Inflow=0.00 cfs 0 cf
 4.0" Round Culvert n=0.010 L=30.0' S=0.2667 '/' Outflow=0.00 cfs 0 cf

Pond 6P: New Driveway CB Peak Elev=128.59' Inflow=0.02 cfs 88 cf
 4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/' Outflow=0.02 cfs 88 cf

Pond 7P: Trench Drain CB-7 Peak Elev=121.56' Inflow=0.01 cfs 43 cf
 4.0" Round Culvert n=0.010 L=10.0' S=0.2500 '/' Outflow=0.01 cfs 43 cf

Pond 8P: Trench Drain CB-8 Peak Elev=119.57' Inflow=0.01 cfs 63 cf
 4.0" Round Culvert n=0.010 L=20.0' S=0.0250 '/' Outflow=0.01 cfs 63 cf

Pond 13P: Catch Basin Peak Elev=119.08' Inflow=0.02 cfs 82 cf
 4.0" Round Culvert n=0.010 L=10.0' S=0.0500 '/' Outflow=0.02 cfs 82 cf

Pond WST-1: Water Storage Tank -1 Peak Elev=120.28' Storage=88 cf Inflow=0.02 cfs 88 cf
 6.0" Round Culvert n=0.010 L=10.0' S=0.0500 '/' Outflow=0.00 cfs 0 cf

Pond WST-2: Water Storage Tank - 2 Peak Elev=111.39' Storage=188 cf Inflow=0.04 cfs 188 cf
 6.0" Round Culvert n=0.010 L=10.0' S=0.1000 '/' Outflow=0.00 cfs 0 cf

Total Runoff Area = 5,355 sf Runoff Volume = 276 cf Average Runoff Depth = 0.62"
21.64% Pervious = 1,159 sf 78.36% Impervious = 4,196 sf

Summary for Subcatchment SC-13: House Entry/Foyer/Garage Roof and the Foyer Deck

[49] Hint: $T_c < 2dt$ may require smaller dt

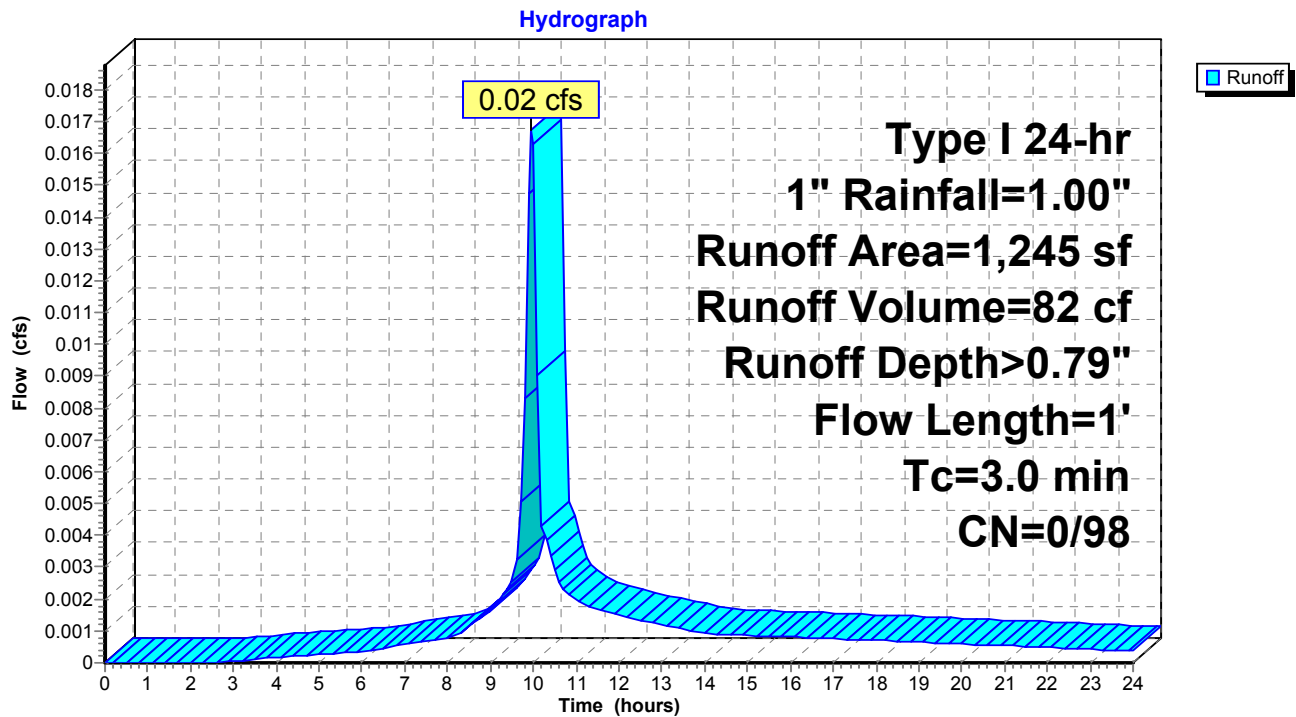
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 82 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
* 1,245	98	Impervious
1,245	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-13: House Entry/Foyer/Garage Roof and the Foyer Deck



Summary for Subcatchment SC-5: Upper Private Open Space

[49] Hint: $T_c < 2dt$ may require smaller dt
 [73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"

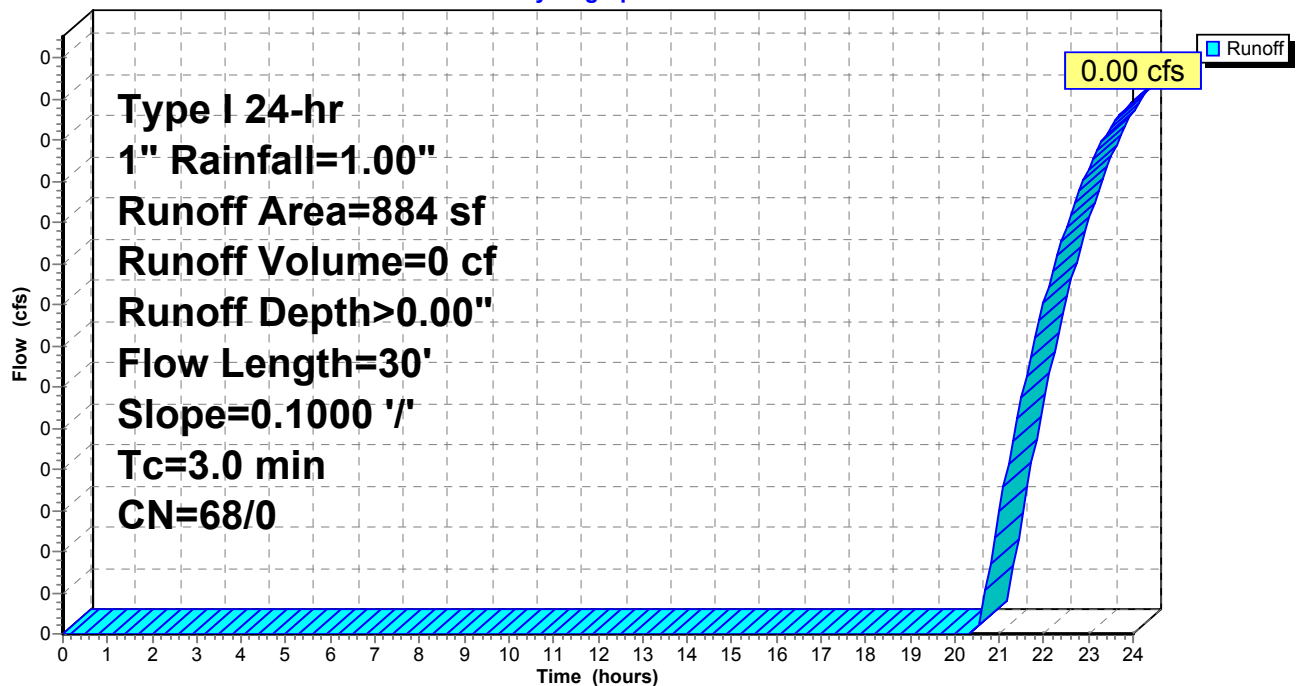
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
884	68	<50% Grass cover, Poor, HSG A
884	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	30	0.1000	2.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.2	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-5: Upper Private Open Space

Hydrograph



Summary for Subcatchment SC-6: Widened 1925 ECDLL driveway and adjacent easterly vegetated side yard

[49] Hint: $T_c < 2dt$ may require smaller dt

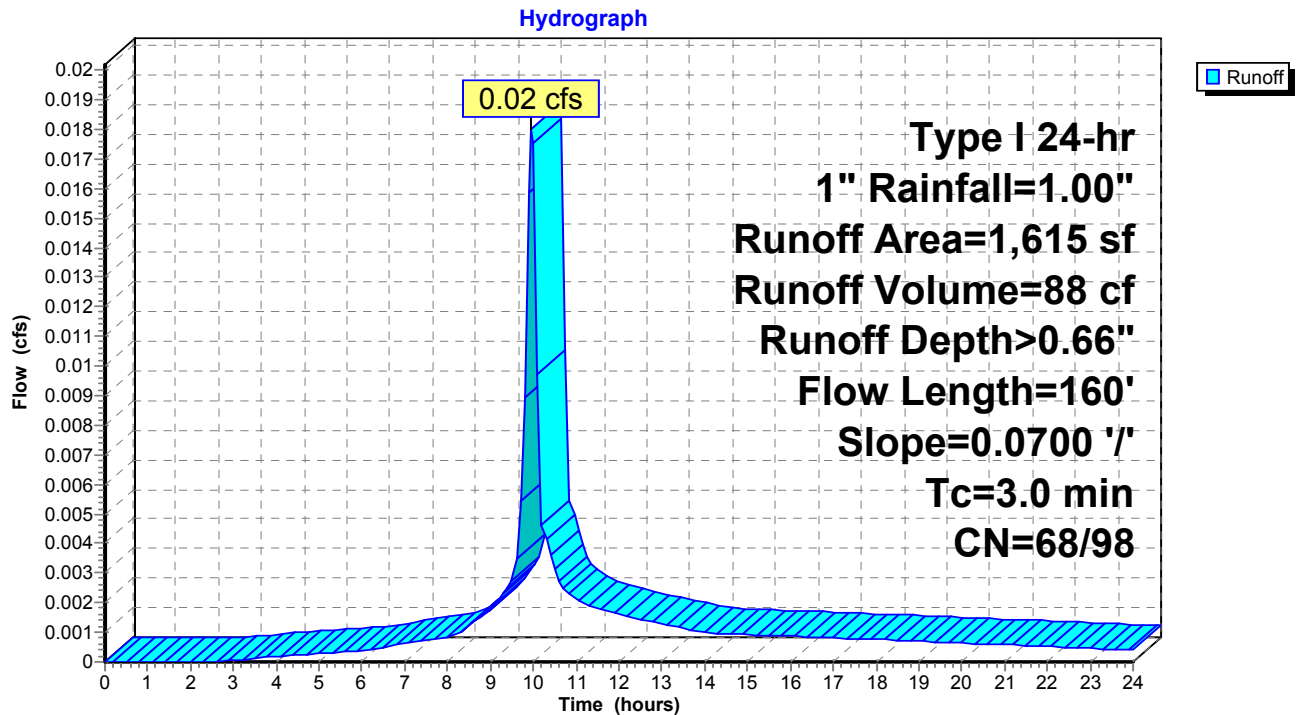
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 88 cf, Depth > 0.66"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

	Area (sf)	CN	Description
*	1,340	98	Impervious
	275	68	<50% Grass cover, Poor, HSG A
	1,615	93	Weighted Average
	275	68	17.03% Pervious Area
	1,340	98	82.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	160	0.0700	1.95		Sheet Flow, n= 0.015 P2= 3.20"
1.4	160	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-6: Widened 1925 ECDLL driveway and adjacent easterly vegetated side yard



Summary for Subcatchment SC-7: New 1925 ECDLL Lower Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

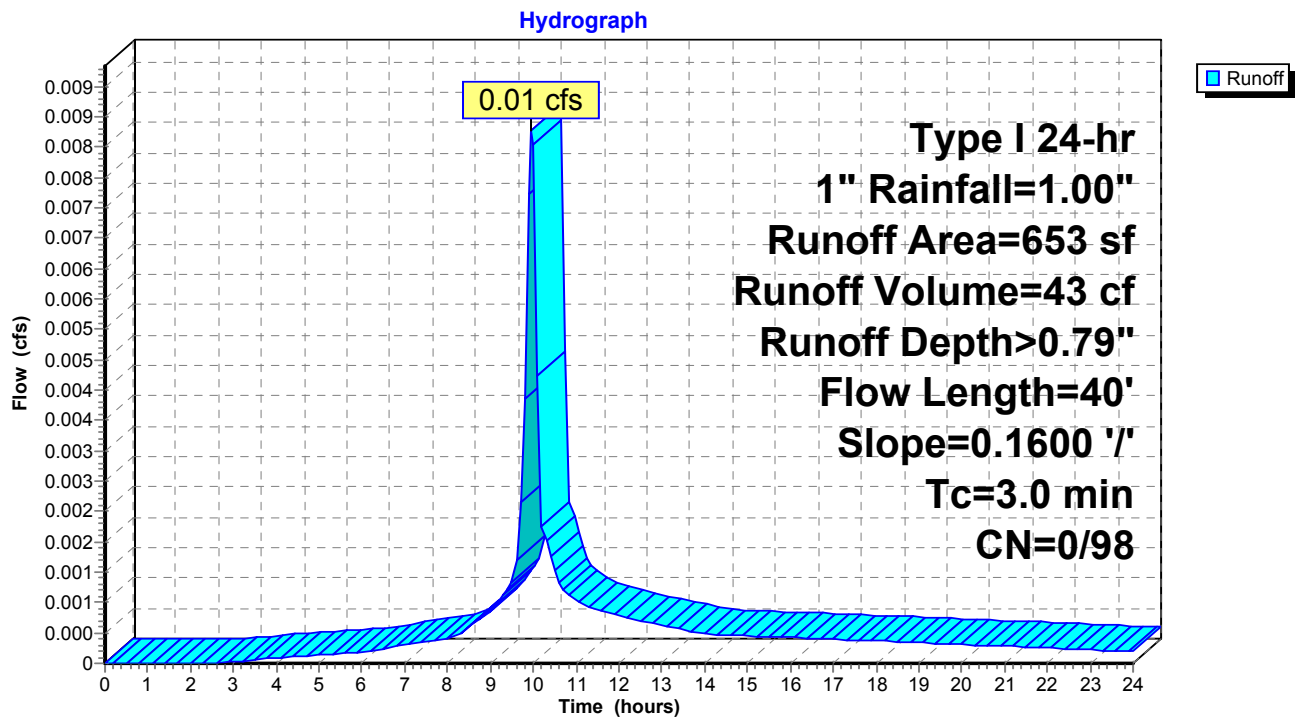
Runoff = 0.01 cfs @ 9.97 hrs, Volume= 43 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
* 653	98	Impervious
653	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	40	0.1600	2.05		Sheet Flow, $n=0.015$ $P2=3.20"$
0.3	40	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-7: New 1925 ECDLL Lower Driveway



Summary for Subcatchment SC-8: New 1925 ECDLL Garage Entry Driveway and Turnaround

[49] Hint: $T_c < 2dt$ may require smaller dt

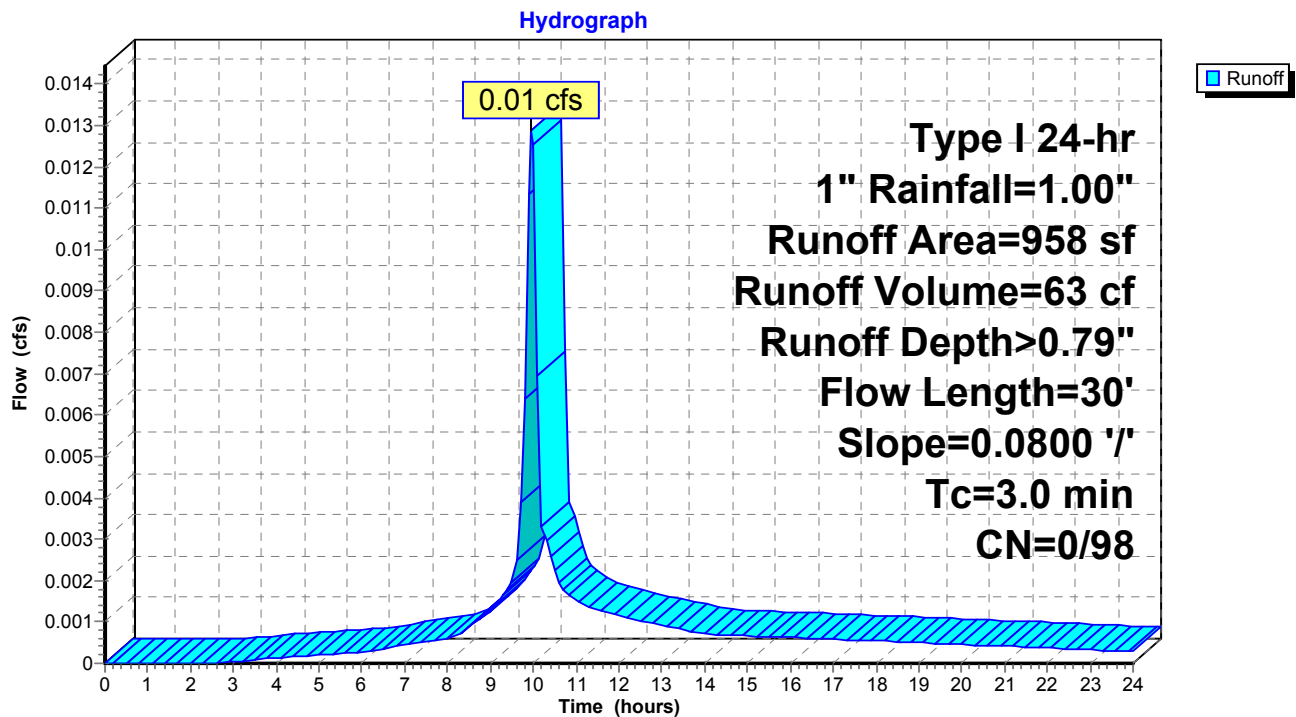
Runoff = 0.01 cfs @ 9.97 hrs, Volume= 63 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
* 958	98	Impervious
958	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0800	1.47		Sheet Flow, n= 0.015 P2= 3.20"
0.3	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-8: New 1925 ECDLL Garage Entry Driveway and Turnaround



Summary for Pond 5P: Catch Basin

[57] Hint: Peaked at 127.00' (Flood elevation advised)

Inflow Area = 884 sf, 0.00% Impervious, Inflow Depth > 0.00" for 1" event
 Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0 cf
 Outflow = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.00 cfs @ 24.00 hrs, Volume= 0 cf

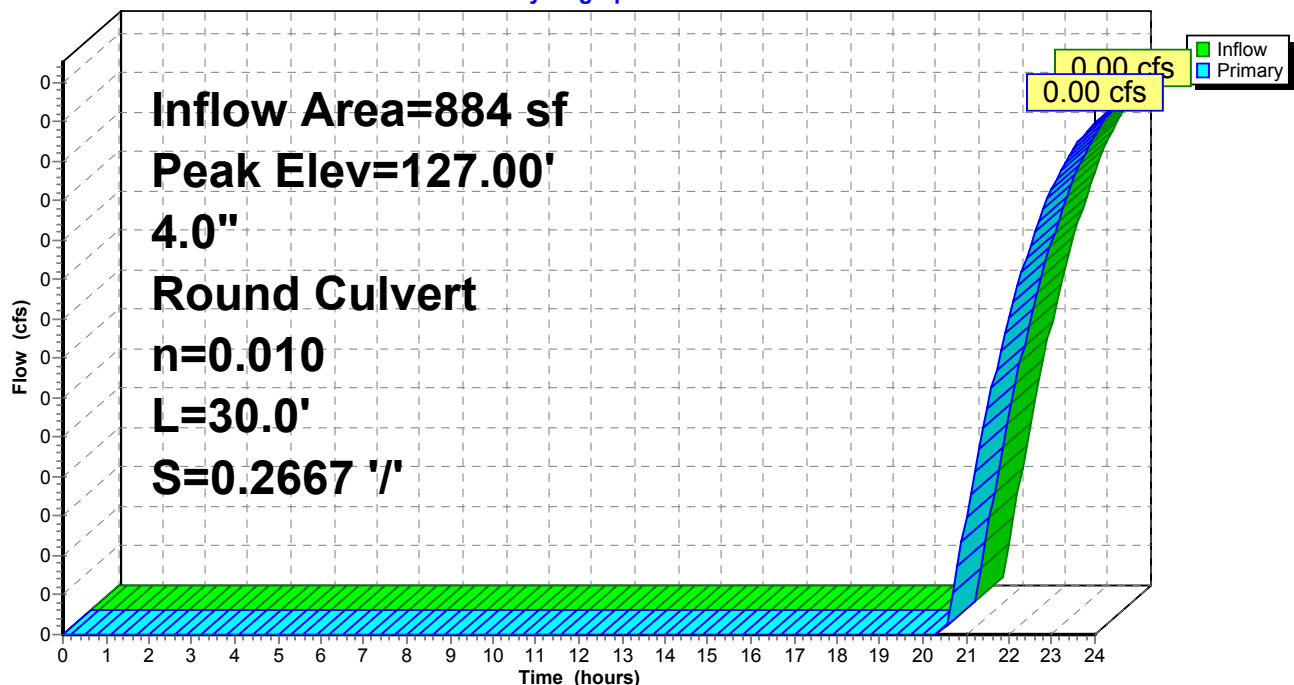
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 127.00' @ 24.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	127.00'	4.0" Round Culvert L= 30.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 127.00' / 119.00' S= 0.2667 ' S= 0.2667 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.00 cfs @ 24.00 hrs HW=127.00' (Free Discharge)
 1=Culvert (Inlet Controls 0.00 cfs @ 0.09 fps)

Pond 5P: Catch Basin

Hydrograph



Summary for Pond 6P: New Driveway CB

[57] Hint: Peaked at 128.59' (Flood elevation advised)

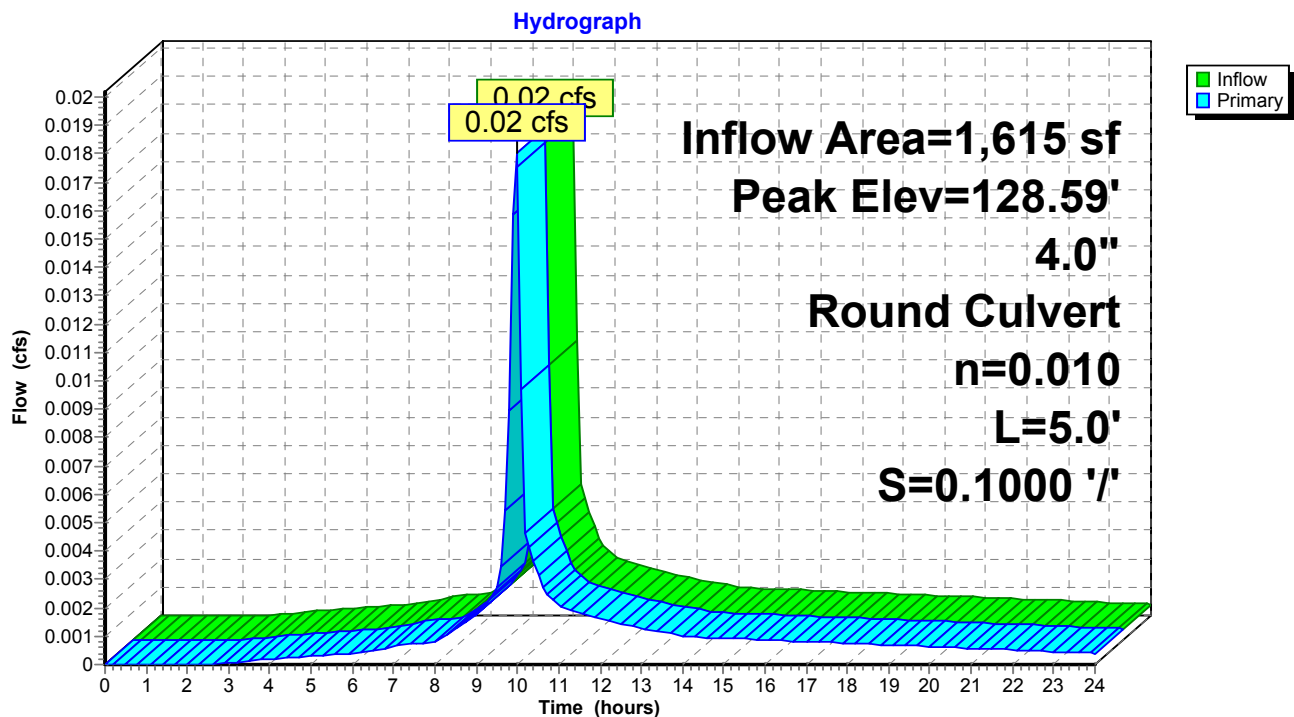
Inflow Area = 1,615 sf, 82.97% Impervious, Inflow Depth > 0.66" for 1" event
 Inflow = 0.02 cfs @ 9.97 hrs, Volume= 88 cf
 Outflow = 0.02 cfs @ 9.97 hrs, Volume= 88 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.97 hrs, Volume= 88 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 128.59' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	128.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.50' / 128.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.97 hrs HW=128.58' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.02 cfs @ 0.99 fps)

Pond 6P: New Driveway CB



Summary for Pond 7P: Trench Drain CB-7

[57] Hint: Peaked at 121.56' (Flood elevation advised)

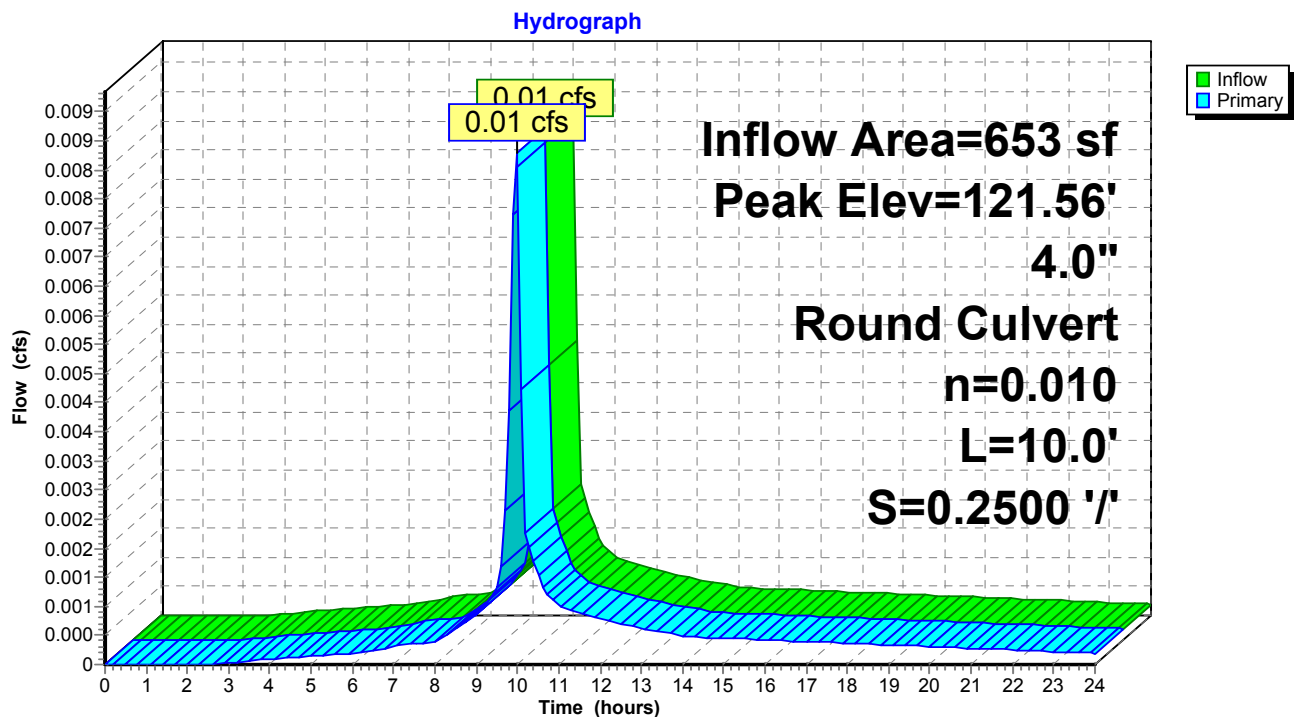
Inflow Area = 653 sf, 100.00% Impervious, Inflow Depth > 0.79" for 1" event
 Inflow = 0.01 cfs @ 9.97 hrs, Volume= 43 cf
 Outflow = 0.01 cfs @ 9.97 hrs, Volume= 43 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 9.97 hrs, Volume= 43 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 121.56' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	4.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.50' / 119.00' S= 0.2500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 9.97 hrs HW=121.56' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.01 cfs @ 0.82 fps)

Pond 7P: Trench Drain CB-7



Summary for Pond 8P: Trench Drain CB-8

[57] Hint: Peaked at 119.57' (Flood elevation advised)

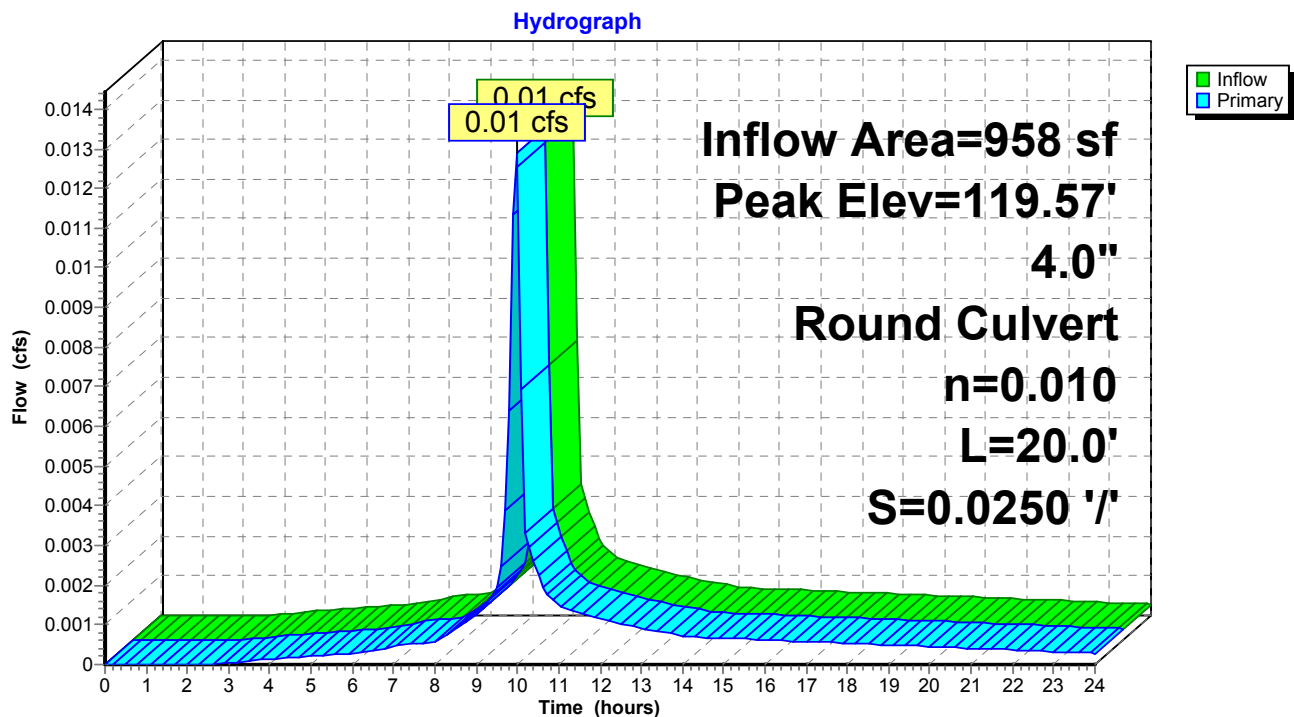
Inflow Area = 958 sf, 100.00% Impervious, Inflow Depth > 0.79" for 1" event
 Inflow = 0.01 cfs @ 9.97 hrs, Volume= 63 cf
 Outflow = 0.01 cfs @ 9.97 hrs, Volume= 63 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 9.97 hrs, Volume= 63 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 119.57' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	119.50'	4.0" Round Culvert L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.50' / 119.00' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 9.97 hrs HW=119.57' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.01 cfs @ 0.90 fps)

Pond 8P: Trench Drain CB-8



Summary for Pond 13P: Catch Basin

[57] Hint: Peaked at 119.08' (Flood elevation advised)

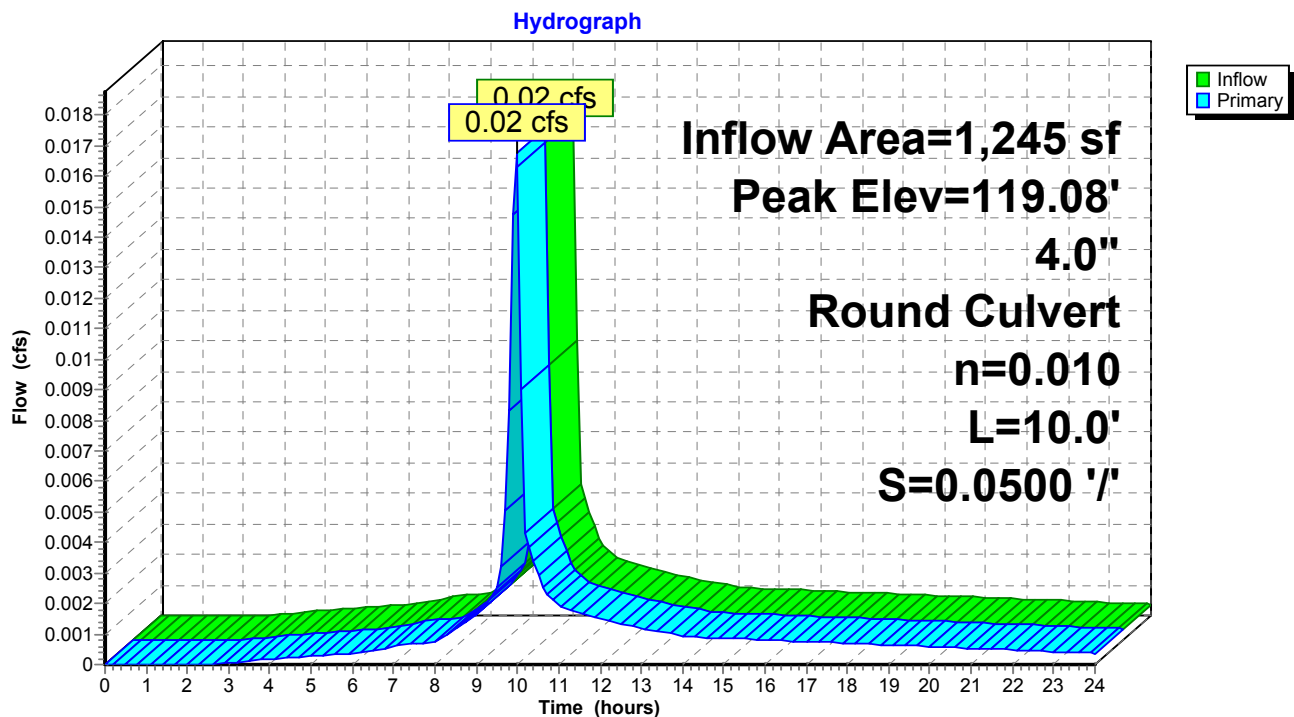
Inflow Area = 1,245 sf, 100.00% Impervious, Inflow Depth > 0.79" for 1" event
 Inflow = 0.02 cfs @ 9.97 hrs, Volume= 82 cf
 Outflow = 0.02 cfs @ 9.97 hrs, Volume= 82 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.97 hrs, Volume= 82 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 119.08' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	119.00'	4.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.00' / 118.50' S= 0.0500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.97 hrs HW=119.08' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.02 cfs @ 0.97 fps)

Pond 13P: Catch Basin



Summary for Pond WST-1: Water Storage Tank -1

Inflow Area = 1,615 sf, 82.97% Impervious, Inflow Depth > 0.66" for 1" event
 Inflow = 0.02 cfs @ 9.97 hrs, Volume= 88 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 120.28' @ 24.00 hrs Surf.Area= 100 sf Storage= 88 cf

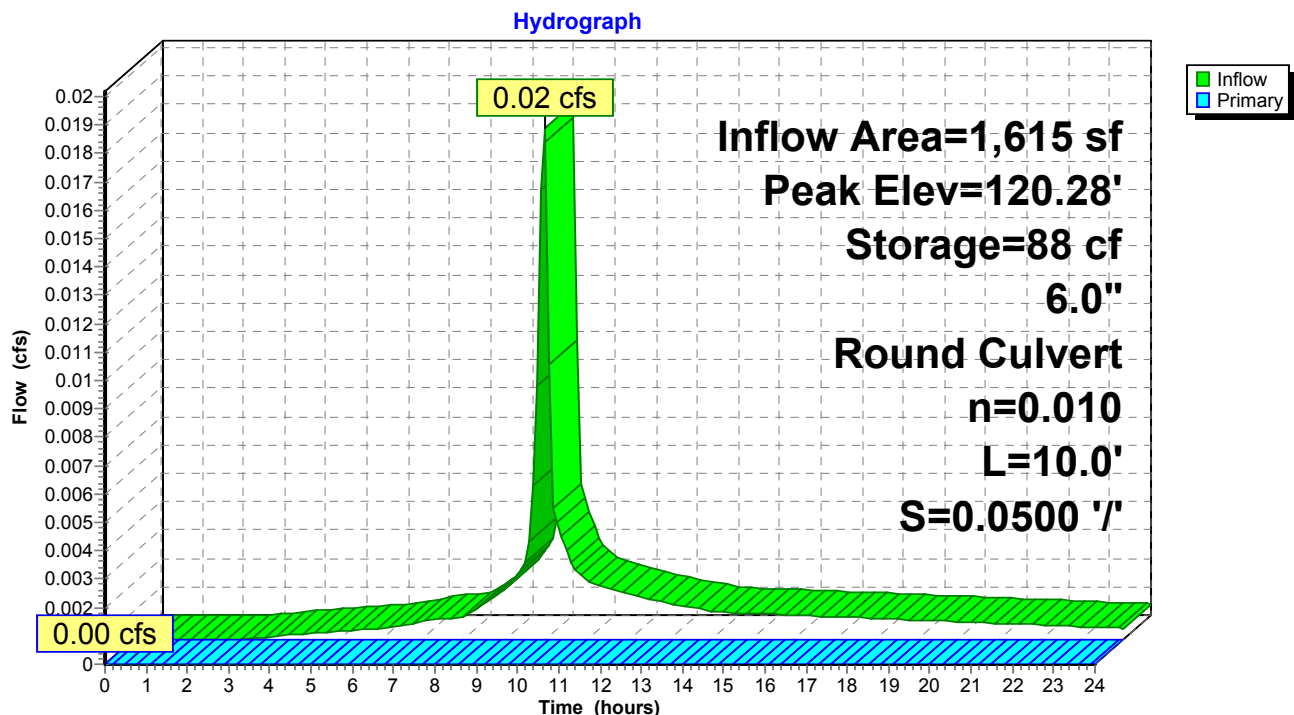
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	1,018 cf	108.0" Round Pipe Storage L= 16.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	127.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 127.50' / 127.00' S= 0.0500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=119.00' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-1: Water Storage Tank -1



Summary for Pond WST-2: Water Storage Tank - 2

Inflow Area = 3,740 sf, 76.36% Impervious, Inflow Depth > 0.60" for 1" event
 Inflow = 0.04 cfs @ 9.97 hrs, Volume= 188 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 111.39' @ 24.00 hrs Surf.Area= 195 sf Storage= 188 cf

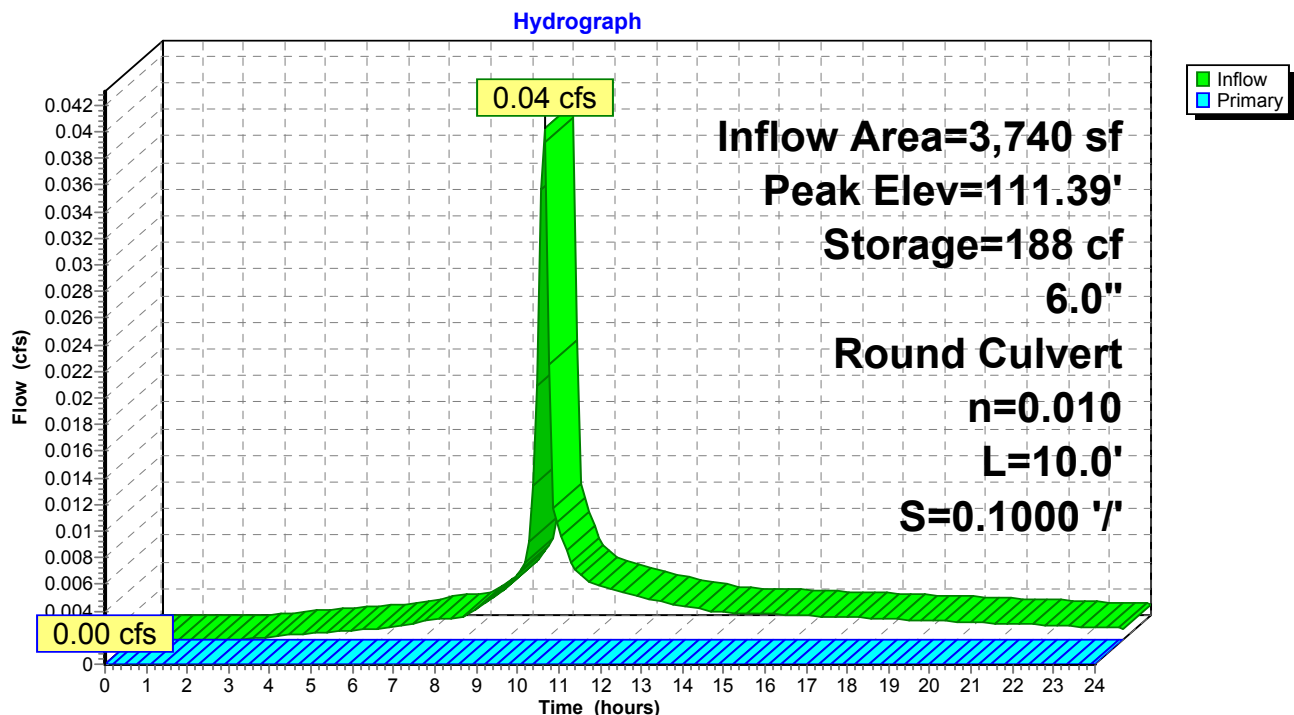
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	110.00'	1,909 cf	108.0" Round Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	118.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 118.50' / 117.50' S= 0.1000 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=110.00' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-2: Water Storage Tank - 2



1925 ECDLL_Post Construction Analysis Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Prepared by CSA

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-13: HouseRunoff Area=1,245 sf 100.00% Impervious Runoff Depth>2.97"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.06 cfs 308 cf**Subcatchment SC-5: Upper Private Open**Runoff Area=884 sf 0.00% Impervious Runoff Depth>0.73"
Flow Length=30' Slope=0.1000 '/ Tc=3.0 min CN=68/0 Runoff=0.01 cfs 54 cf**Subcatchment SC-6: Widened 1925 ECDLL**Runoff Area=1,615 sf 82.97% Impervious Runoff Depth>2.59"
Flow Length=160' Slope=0.0700 '/ Tc=3.0 min CN=68/98 Runoff=0.07 cfs 348 cf**Subcatchment SC-7: New 1925 ECDLL**Runoff Area=653 sf 100.00% Impervious Runoff Depth>2.97"
Flow Length=40' Slope=0.1600 '/ Tc=3.0 min CN=0/98 Runoff=0.03 cfs 161 cf**Subcatchment SC-8: New 1925 ECDLL**Runoff Area=958 sf 100.00% Impervious Runoff Depth>2.97"
Flow Length=30' Slope=0.0800 '/ Tc=3.0 min CN=0/98 Runoff=0.05 cfs 237 cf**Pond 5P: Catch Basin**Peak Elev=127.06' Inflow=0.01 cfs 54 cf
4.0" Round Culvert n=0.010 L=30.0' S=0.2667 '/ Outflow=0.01 cfs 54 cf**Pond 6P: New Driveway CB**Peak Elev=128.68' Inflow=0.07 cfs 348 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/ Outflow=0.07 cfs 348 cf**Pond 7P: Trench Drain CB-7**Peak Elev=121.62' Inflow=0.03 cfs 161 cf
4.0" Round Culvert n=0.010 L=10.0' S=0.2500 '/ Outflow=0.03 cfs 161 cf**Pond 8P: Trench Drain CB-8**Peak Elev=119.64' Inflow=0.05 cfs 237 cf
4.0" Round Culvert n=0.010 L=20.0' S=0.0250 '/ Outflow=0.05 cfs 237 cf**Pond 13P: Catch Basin**Peak Elev=119.17' Inflow=0.06 cfs 308 cf
4.0" Round Culvert n=0.010 L=10.0' S=0.0500 '/ Outflow=0.06 cfs 308 cf**Pond WST-1: Water Storage Tank -1**Peak Elev=122.37' Storage=348 cf Inflow=0.07 cfs 348 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.0500 '/ Outflow=0.00 cfs 0 cf**Pond WST-2: Water Storage Tank - 2**Peak Elev=113.77' Storage=759 cf Inflow=0.14 cfs 760 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.1000 '/ Outflow=0.00 cfs 0 cf**Total Runoff Area = 5,355 sf Runoff Volume = 1,108 cf Average Runoff Depth = 2.48"**
21.64% Pervious = 1,159 sf 78.36% Impervious = 4,196 sf

Summary for Subcatchment SC-13: House Entry/Foyer/Garage Roof and the Foyer Deck

[49] Hint: $T_c < 2dt$ may require smaller dt

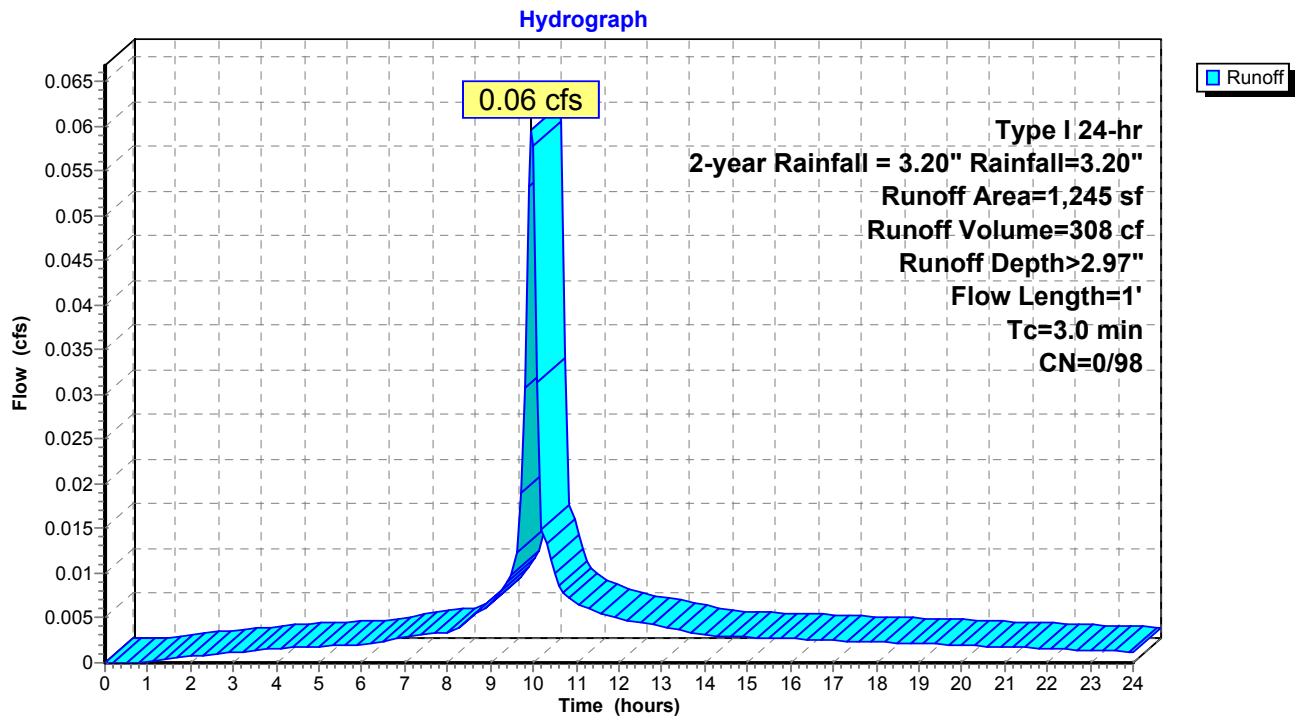
Runoff = 0.06 cfs @ 9.96 hrs, Volume= 308 cf, Depth> 2.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
* 1,245	98	Impervious
1,245	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-13: House Entry/Foyer/Garage Roof and the Foyer Deck



Summary for Subcatchment SC-5: Upper Private Open Space

[49] Hint: $T_c < 2dt$ may require smaller dt

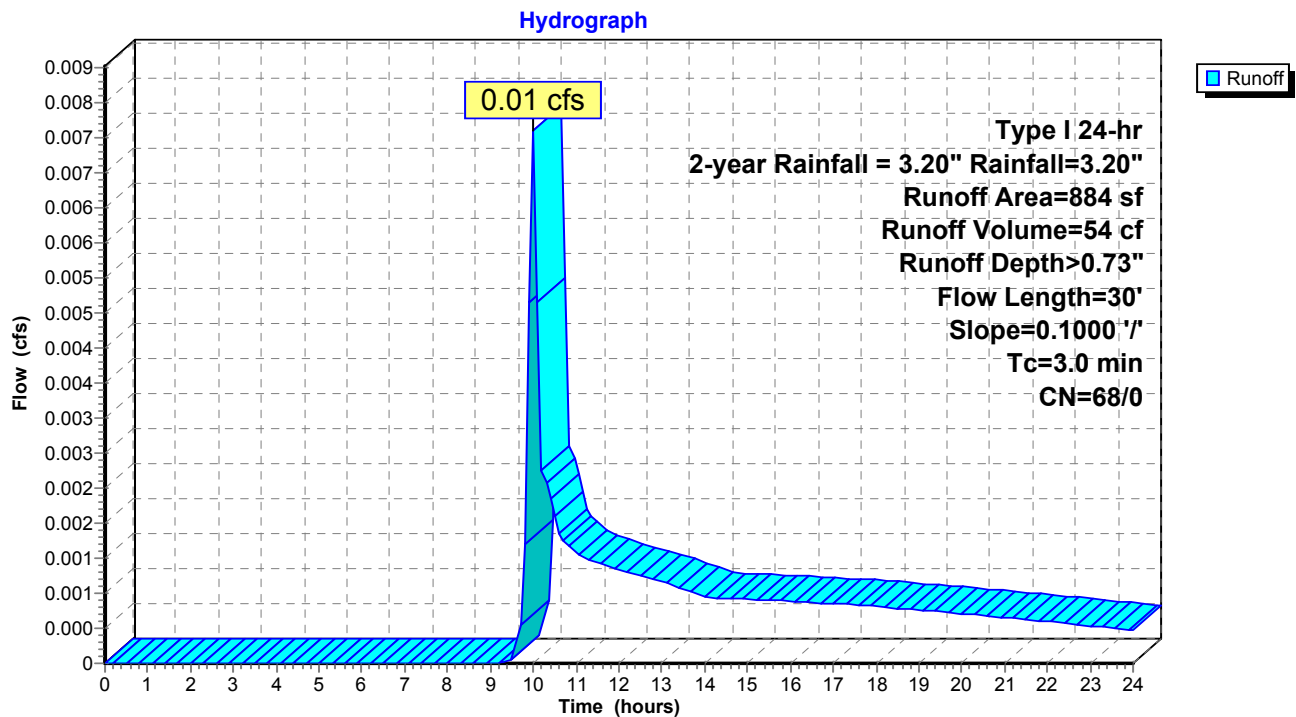
Runoff = 0.01 cfs @ 10.00 hrs, Volume= 54 cf, Depth> 0.73"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
884	68	<50% Grass cover, Poor, HSG A
884	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	30	0.1000	2.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.2	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-5: Upper Private Open Space



Summary for Subcatchment SC-6: Widened 1925 ECDLL driveway and adjacent easterly vegetated side yard

[49] Hint: $T_c < 2dt$ may require smaller dt

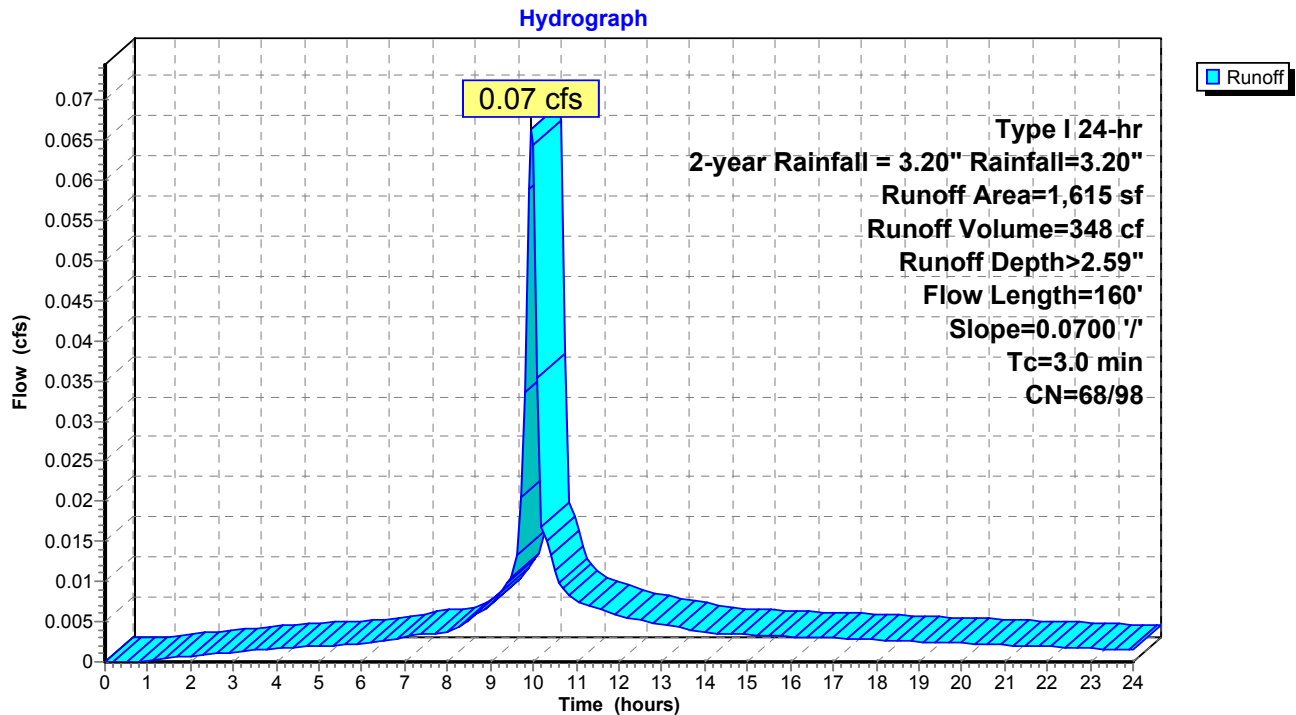
Runoff = 0.07 cfs @ 9.97 hrs, Volume= 348 cf, Depth > 2.59"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt = 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
* 1,340	98	Impervious
275	68	<50% Grass cover, Poor, HSG A
1,615	93	Weighted Average
275	68	17.03% Pervious Area
1,340	98	82.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	160	0.0700	1.95		Sheet Flow, n= 0.015 P2= 3.20"
1.4	160	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-6: Widened 1925 ECDLL driveway and adjacent easterly vegetated side yard



Summary for Subcatchment SC-7: New 1925 ECDLL Lower Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

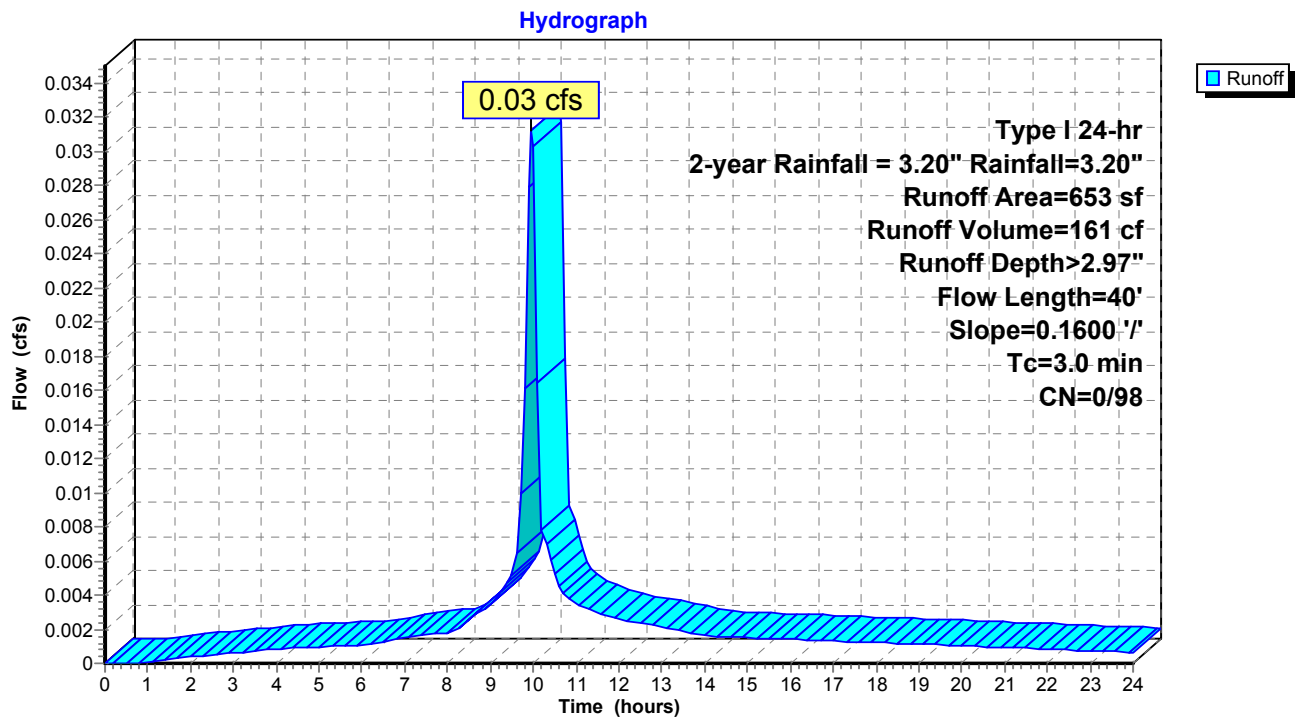
Runoff = 0.03 cfs @ 9.96 hrs, Volume= 161 cf, Depth> 2.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
* 653	98	Impervious
653	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	40	0.1600	2.05		Sheet Flow, n= 0.015 P2= 3.20"
0.3	40	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-7: New 1925 ECDLL Lower Driveway



Summary for Subcatchment SC-8: New 1925 ECDLL Garage Entry Driveway and Turnaround

[49] Hint: $T_c < 2dt$ may require smaller dt

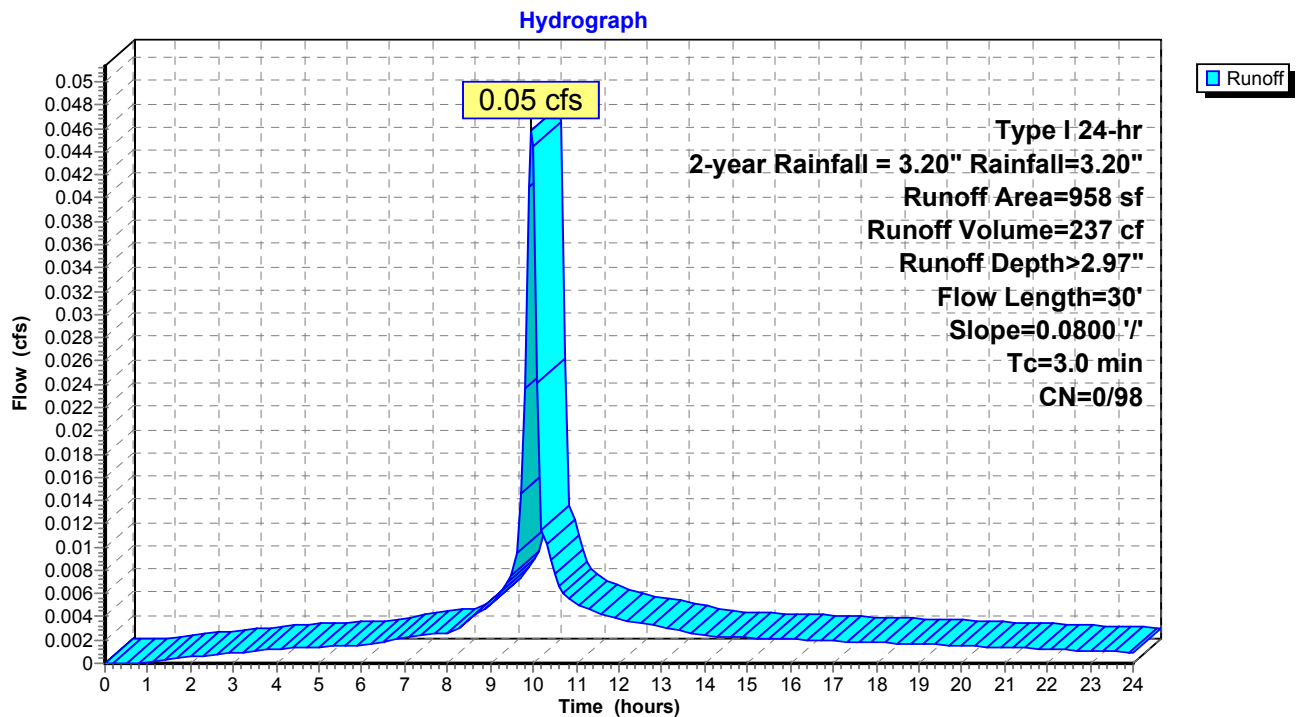
Runoff = 0.05 cfs @ 9.96 hrs, Volume= 237 cf, Depth> 2.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
* 958	98	Impervious
958	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0800	1.47		Sheet Flow, n= 0.015 P2= 3.20"
0.3	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-8: New 1925 ECDLL Garage Entry Driveway and Turnaround



Summary for Pond 5P: Catch Basin

[57] Hint: Peaked at 127.06' (Flood elevation advised)

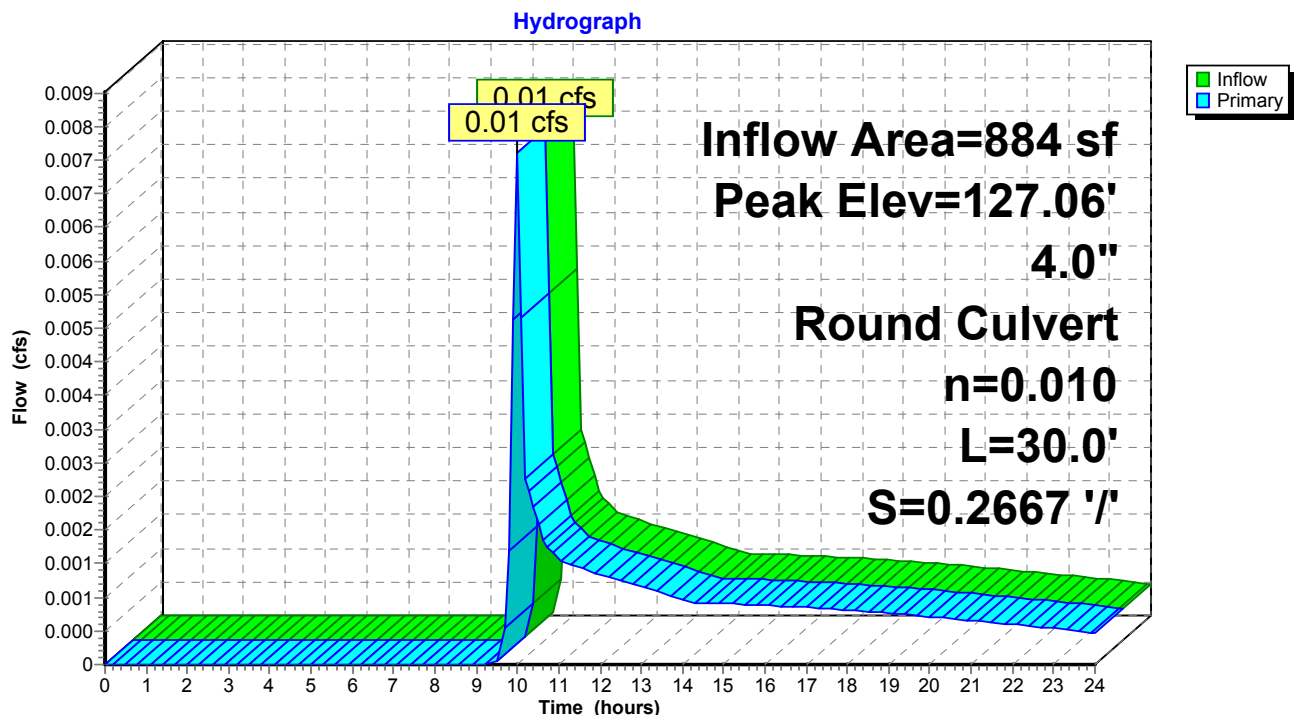
Inflow Area = 884 sf, 0.00% Impervious, Inflow Depth > 0.73" for 2-year Rainfall = 3.20" event
 Inflow = 0.01 cfs @ 10.00 hrs, Volume= 54 cf
 Outflow = 0.01 cfs @ 10.00 hrs, Volume= 54 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 10.00 hrs, Volume= 54 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 127.06' @ 10.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	127.00'	4.0" Round Culvert L= 30.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 127.00' / 119.00' S= 0.2667 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 10.00 hrs HW=127.06' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.01 cfs @ 0.80 fps)

Pond 5P: Catch Basin



Summary for Pond 6P: New Driveway CB

[57] Hint: Peaked at 128.68' (Flood elevation advised)

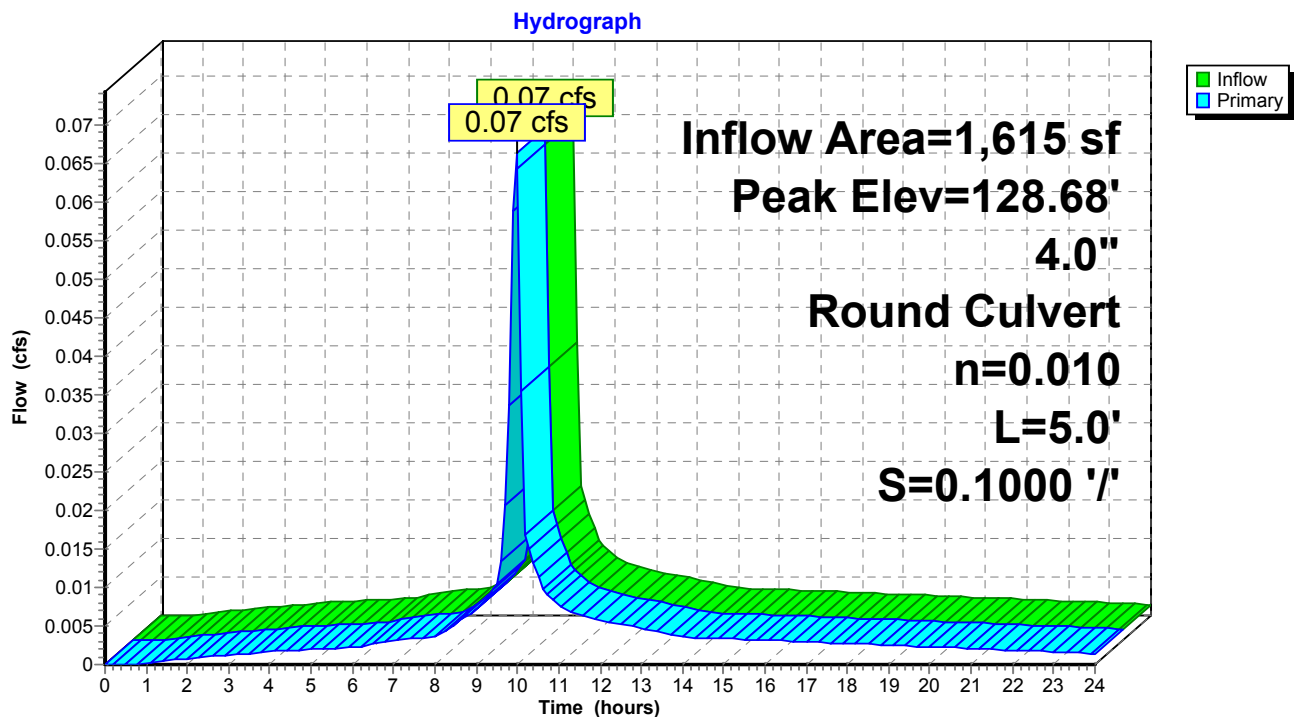
Inflow Area = 1,615 sf, 82.97% Impervious, Inflow Depth > 2.59" for 2-year Rainfall = 3.20" event
 Inflow = 0.07 cfs @ 9.97 hrs, Volume= 348 cf
 Outflow = 0.07 cfs @ 9.97 hrs, Volume= 348 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.07 cfs @ 9.97 hrs, Volume= 348 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 128.68' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	128.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.50' / 128.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.06 cfs @ 9.97 hrs HW=128.67' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.06 cfs @ 1.40 fps)

Pond 6P: New Driveway CB



Summary for Pond 7P: Trench Drain CB-7

[57] Hint: Peaked at 121.62' (Flood elevation advised)

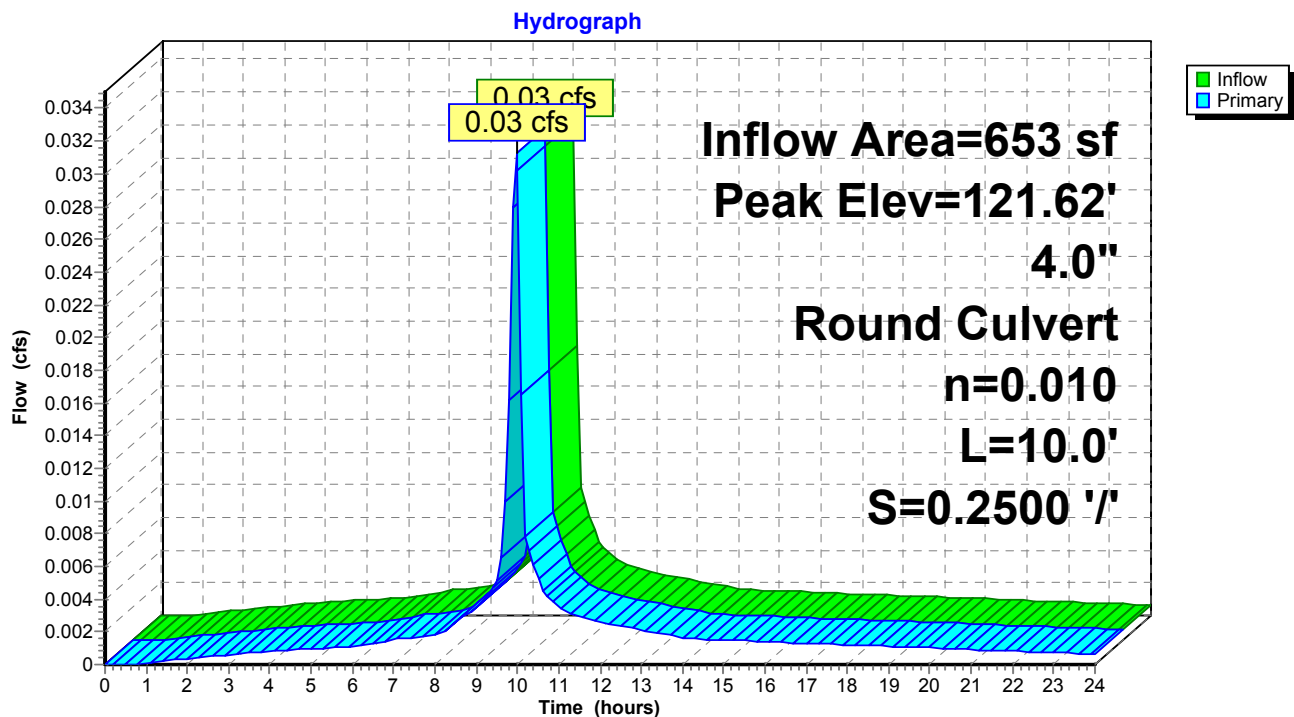
Inflow Area = 653 sf, 100.00% Impervious, Inflow Depth > 2.97" for 2-year Rainfall = 3.20" event
 Inflow = 0.03 cfs @ 9.96 hrs, Volume= 161 cf
 Outflow = 0.03 cfs @ 9.96 hrs, Volume= 161 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.03 cfs @ 9.96 hrs, Volume= 161 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 121.62' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	4.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.50' / 119.00' S= 0.2500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.03 cfs @ 9.96 hrs HW=121.61' (Free Discharge)
 1=Culvert (Inlet Controls 0.03 cfs @ 1.14 fps)

Pond 7P: Trench Drain CB-7



Summary for Pond 8P: Trench Drain CB-8

[57] Hint: Peaked at 119.64' (Flood elevation advised)

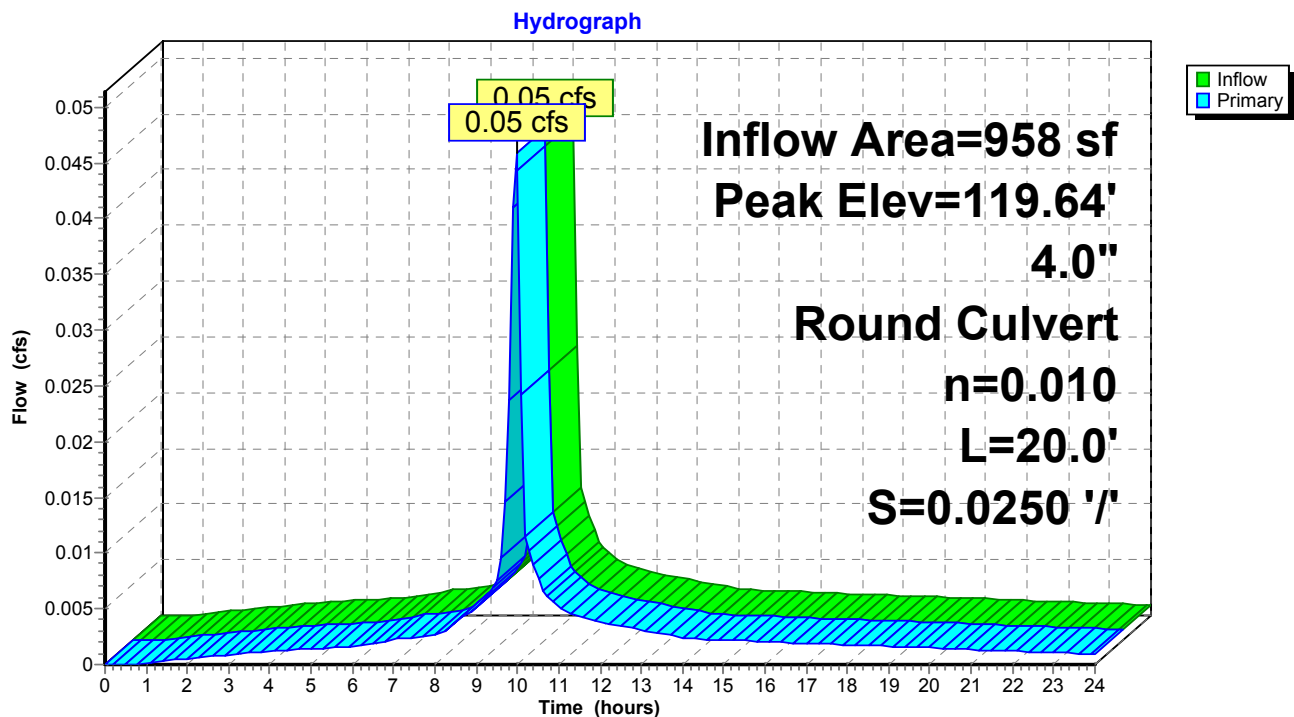
Inflow Area = 958 sf, 100.00% Impervious, Inflow Depth > 2.97" for 2-year Rainfall = 3.20" event
 Inflow = 0.05 cfs @ 9.96 hrs, Volume= 237 cf
 Outflow = 0.05 cfs @ 9.96 hrs, Volume= 237 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 9.96 hrs, Volume= 237 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 119.64' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	119.50'	4.0" Round Culvert L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.50' / 119.00' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.04 cfs @ 9.96 hrs HW=119.64' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.04 cfs @ 1.26 fps)

Pond 8P: Trench Drain CB-8



Summary for Pond 13P: Catch Basin

[57] Hint: Peaked at 119.17' (Flood elevation advised)

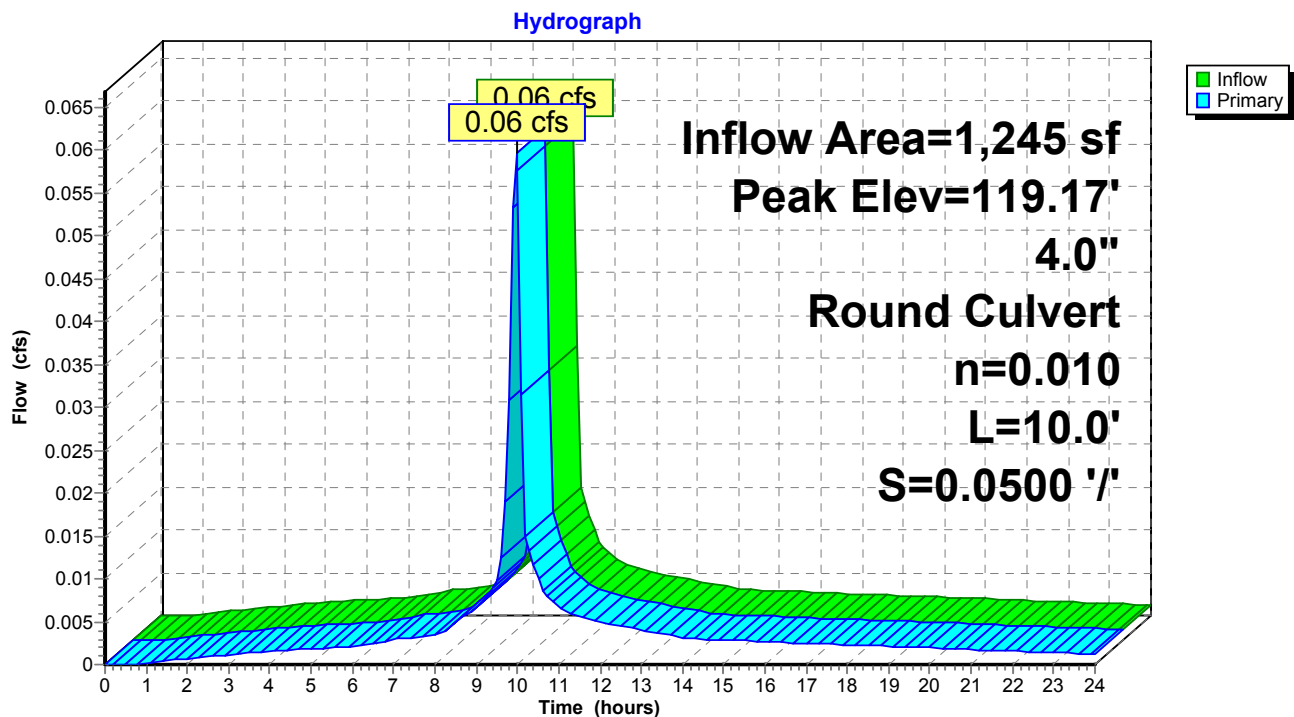
Inflow Area = 1,245 sf, 100.00% Impervious, Inflow Depth > 2.97" for 2-year Rainfall = 3.20" event
 Inflow = 0.06 cfs @ 9.96 hrs, Volume= 308 cf
 Outflow = 0.06 cfs @ 9.96 hrs, Volume= 308 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.06 cfs @ 9.96 hrs, Volume= 308 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 119.17' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	119.00'	4.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.00' / 118.50' S= 0.0500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.06 cfs @ 9.96 hrs HW=119.16' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.06 cfs @ 1.36 fps)

Pond 13P: Catch Basin



Summary for Pond WST-1: Water Storage Tank -1

Inflow Area = 1,615 sf, 82.97% Impervious, Inflow Depth > 2.59" for 2-year Rainfall = 3.20" event
 Inflow = 0.07 cfs @ 9.97 hrs, Volume= 348 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 122.37' @ 24.00 hrs Surf.Area= 139 sf Storage= 348 cf

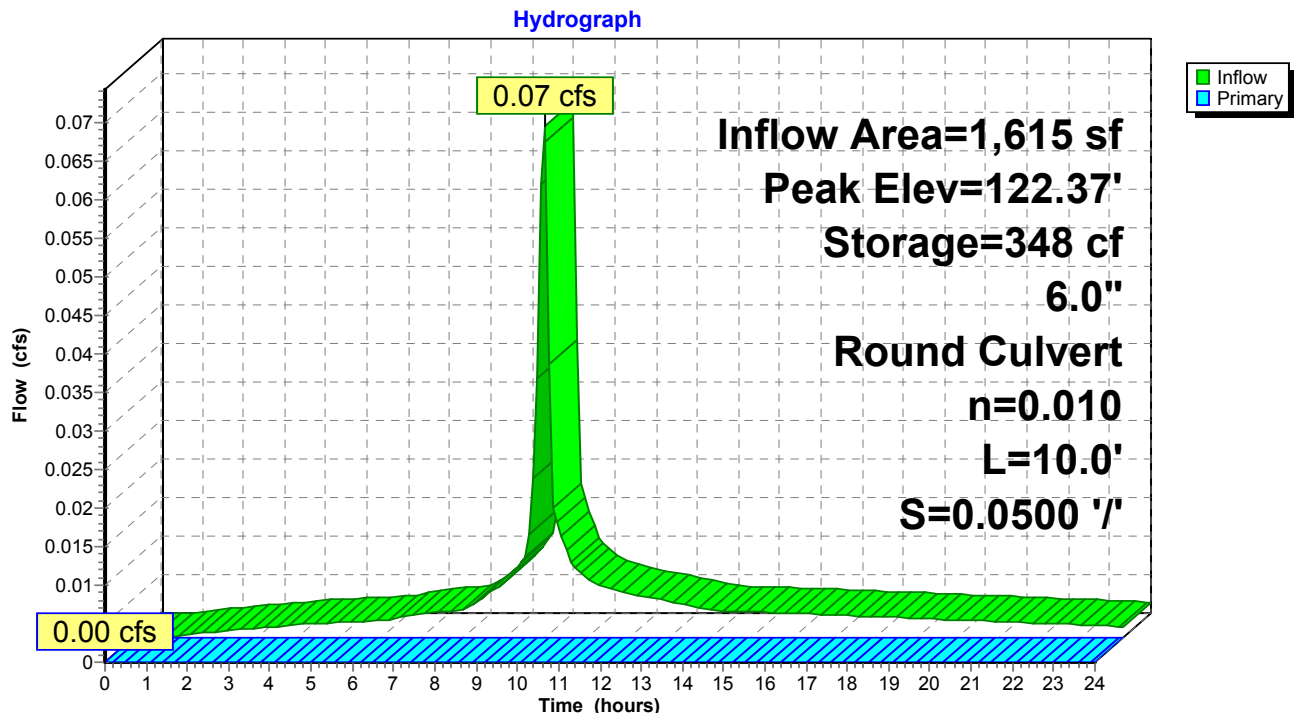
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	1,018 cf	108.0" Round Pipe Storage L= 16.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	127.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 127.50' / 127.00' S= 0.0500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=119.00' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-1: Water Storage Tank -1



Summary for Pond WST-2: Water Storage Tank - 2

Inflow Area = 3,740 sf, 76.36% Impervious, Inflow Depth > 2.44" for 2-year Rainfall = 3.20" event
 Inflow = 0.14 cfs @ 9.97 hrs, Volume= 760 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 113.77' @ 24.00 hrs Surf.Area= 266 sf Storage= 759 cf

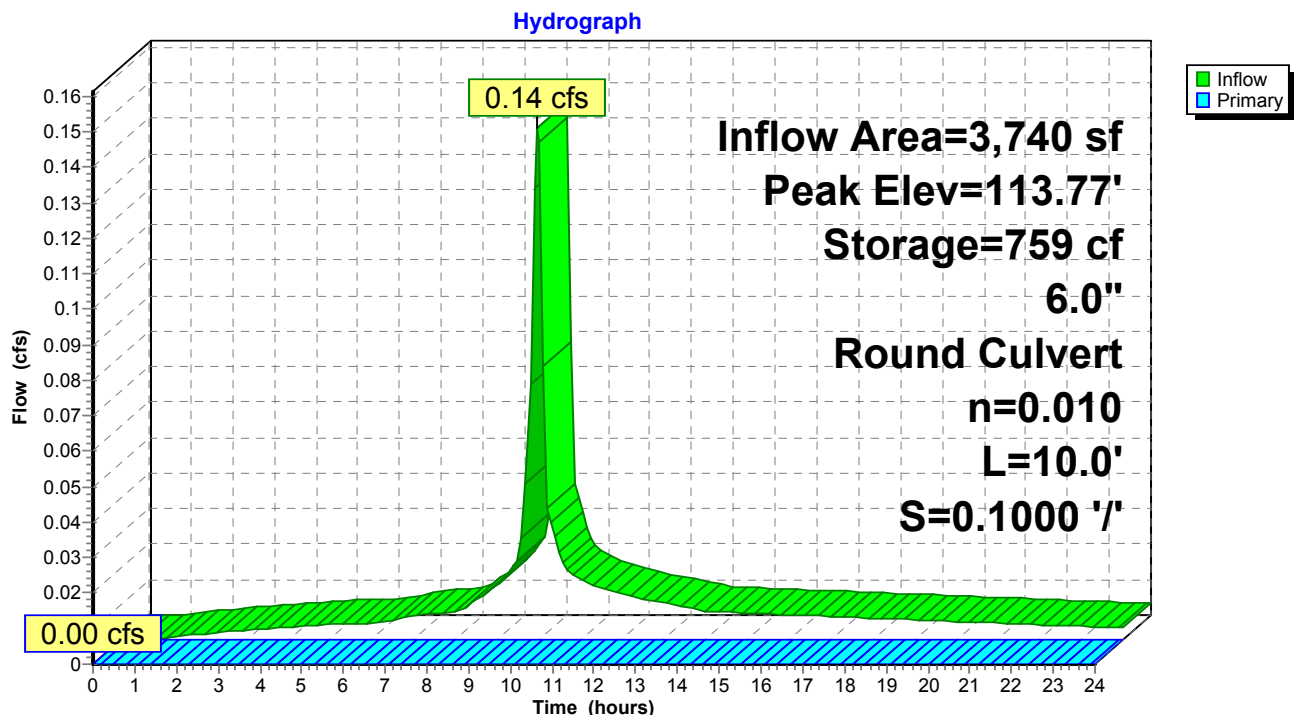
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	110.00'	1,909 cf	108.0" Round Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	118.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 118.50' / 117.50' S= 0.1000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=110.00' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-2: Water Storage Tank - 2



1925 ECDLL_Post Construction Analysis Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Prepared by CSA

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-13: House

Runoff Area=1,245 sf 100.00% Impervious Runoff Depth>4.37"

Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.09 cfs 453 cf

Subcatchment SC-5: Upper Private Open

Runoff Area=884 sf 0.00% Impervious Runoff Depth>1.61"

Flow Length=30' Slope=0.1000 '/' Tc=3.0 min CN=68/0 Runoff=0.02 cfs 118 cf

Subcatchment SC-6: Widened 1925 ECDLL

Runoff Area=1,615 sf 82.97% Impervious Runoff Depth>3.90"

Flow Length=160' Slope=0.0700 '/' Tc=3.0 min CN=68/98 Runoff=0.10 cfs 525 cf

Subcatchment SC-7: New 1925 ECDLL

Runoff Area=653 sf 100.00% Impervious Runoff Depth>4.37"

Flow Length=40' Slope=0.1600 '/' Tc=3.0 min CN=0/98 Runoff=0.05 cfs 238 cf

Subcatchment SC-8: New 1925 ECDLL

Runoff Area=958 sf 100.00% Impervious Runoff Depth>4.37"

Flow Length=30' Slope=0.0800 '/' Tc=3.0 min CN=0/98 Runoff=0.07 cfs 349 cf

Pond 5P: Catch Basin

Peak Elev=127.09' Inflow=0.02 cfs 118 cf

4.0" Round Culvert n=0.010 L=30.0' S=0.2667 '/' Outflow=0.02 cfs 118 cf

Pond 6P: New Driveway CB

Peak Elev=128.72' Inflow=0.10 cfs 525 cf

4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/' Outflow=0.10 cfs 525 cf

Pond 7P: Trench Drain CB-7

Peak Elev=121.64' Inflow=0.05 cfs 238 cf

4.0" Round Culvert n=0.010 L=10.0' S=0.2500 '/' Outflow=0.05 cfs 238 cf

Pond 8P: Trench Drain CB-8

Peak Elev=119.68' Inflow=0.07 cfs 349 cf

4.0" Round Culvert n=0.010 L=20.0' S=0.0250 '/' Outflow=0.07 cfs 349 cf

Pond 13P: Catch Basin

Peak Elev=119.21' Inflow=0.09 cfs 453 cf

4.0" Round Culvert n=0.010 L=10.0' S=0.0500 '/' Outflow=0.09 cfs 453 cf

Pond WST-1: Water Storage Tank -1

Peak Elev=123.61' Storage=524 cf Inflow=0.10 cfs 525 cf

6.0" Round Culvert n=0.010 L=10.0' S=0.0500 '/' Outflow=0.00 cfs 0 cf

Pond WST-2: Water Storage Tank - 2

Peak Elev=115.26' Storage=1,158 cf Inflow=0.22 cfs 1,159 cf

6.0" Round Culvert n=0.010 L=10.0' S=0.1000 '/' Outflow=0.00 cfs 0 cf

Total Runoff Area = 5,355 sf Runoff Volume = 1,683 cf Average Runoff Depth = 3.77"**21.64% Pervious = 1,159 sf 78.36% Impervious = 4,196 sf**

Summary for Subcatchment SC-13: House Entry/Foyer/Garage Roof and the Foyer Deck

[49] Hint: $T_c < 2dt$ may require smaller dt

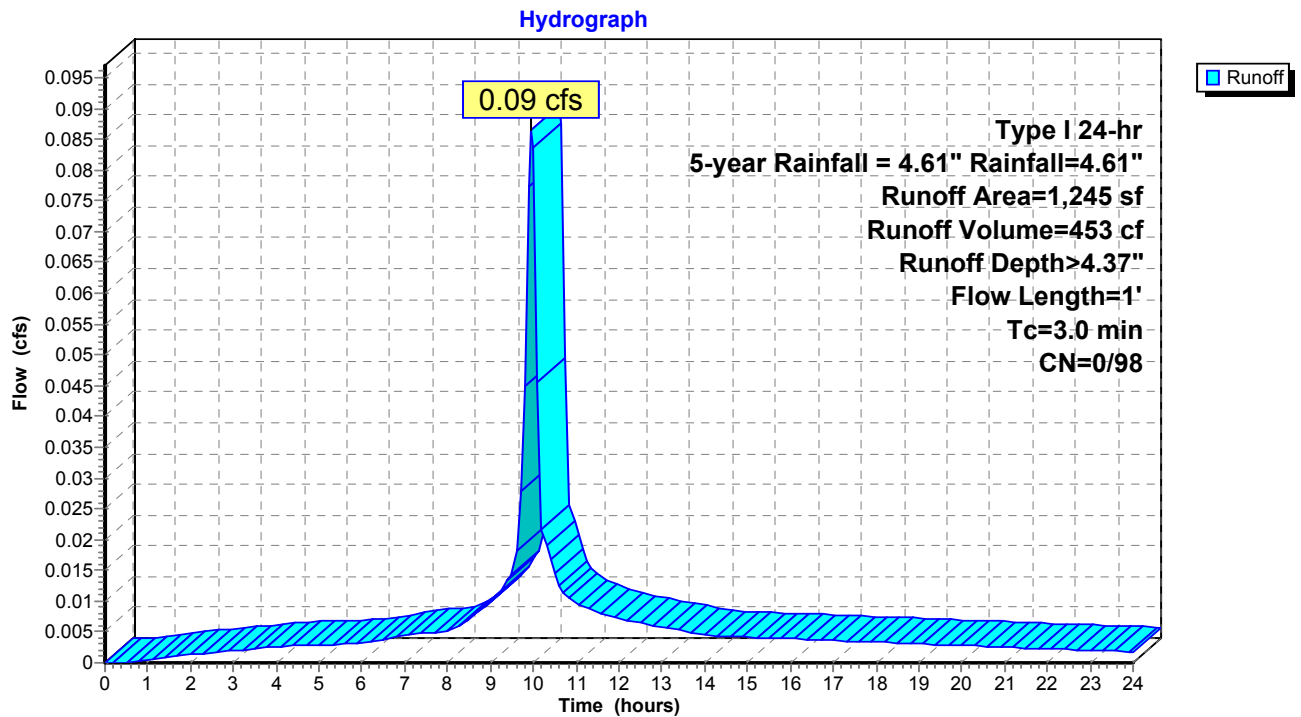
Runoff = 0.09 cfs @ 9.96 hrs, Volume= 453 cf, Depth> 4.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
* 1,245	98	Impervious
1,245	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-13: House Entry/Foyer/Garage Roof and the Foyer Deck



Summary for Subcatchment SC-5: Upper Private Open Space

[49] Hint: $T_c < 2dt$ may require smaller dt

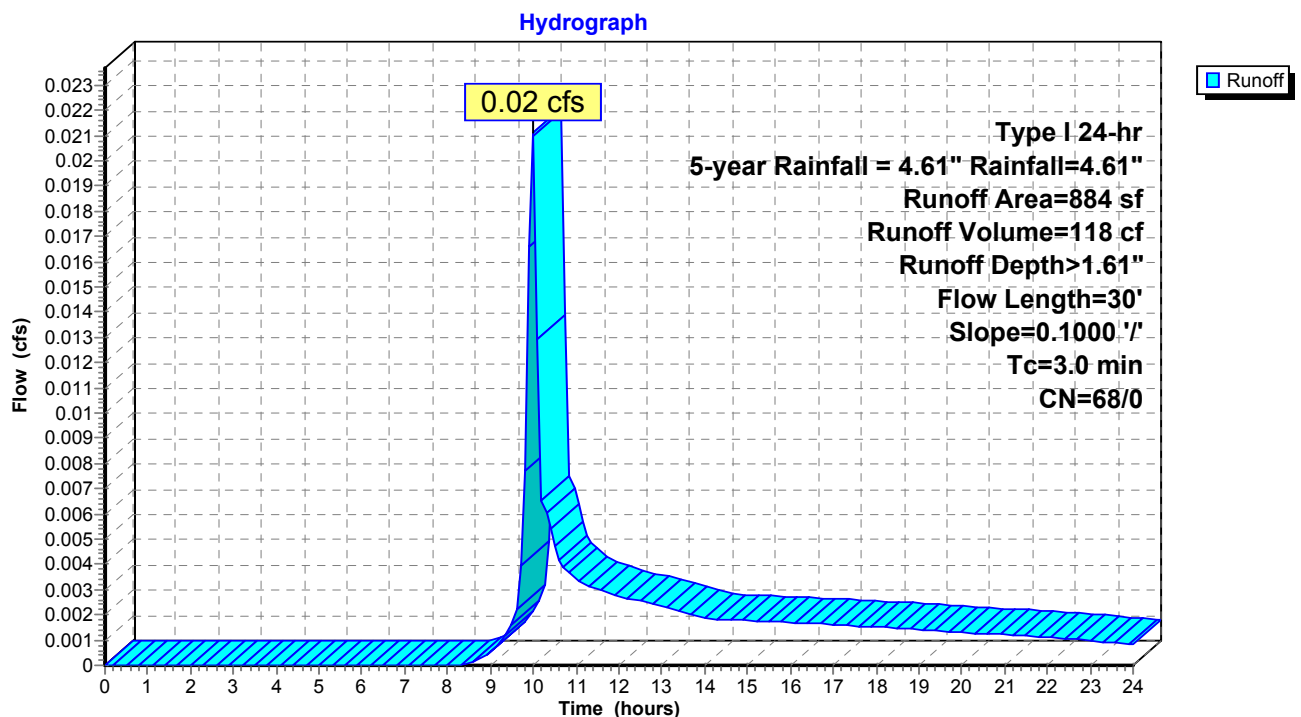
Runoff = 0.02 cfs @ 9.99 hrs, Volume= 118 cf, Depth> 1.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
884	68	<50% Grass cover, Poor, HSG A
884	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	30	0.1000	2.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.2	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-5: Upper Private Open Space



Summary for Subcatchment SC-6: Widened 1925 ECDLL driveway and adjacent easterly vegetated side yard

[49] Hint: $T_c < 2dt$ may require smaller dt

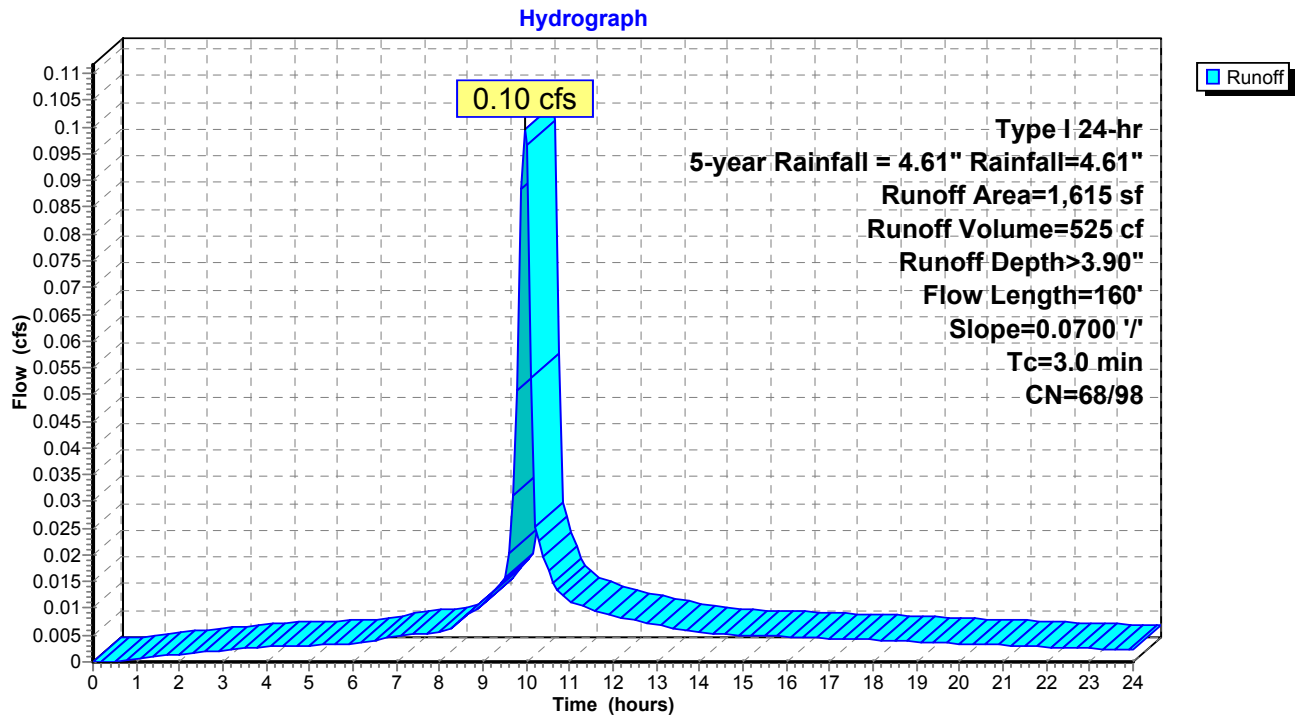
Runoff = 0.10 cfs @ 9.97 hrs, Volume= 525 cf, Depth> 3.90"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
* 1,340	98	Impervious
275	68	<50% Grass cover, Poor, HSG A
1,615	93	Weighted Average
275	68	17.03% Pervious Area
1,340	98	82.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	160	0.0700	1.95		Sheet Flow, n= 0.015 P2= 3.20"
1.4	160	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-6: Widened 1925 ECDLL driveway and adjacent easterly vegetated side yard



Summary for Subcatchment SC-7: New 1925 ECDLL Lower Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

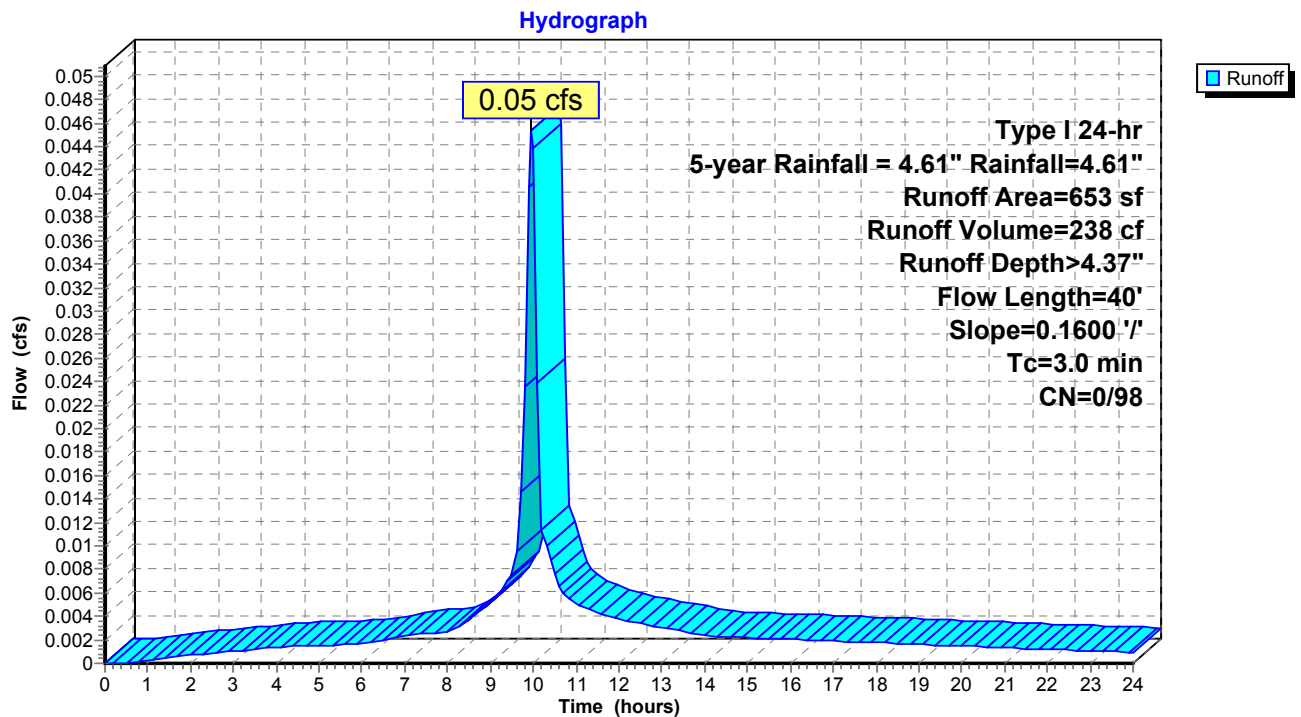
Runoff = 0.05 cfs @ 9.96 hrs, Volume= 238 cf, Depth> 4.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
* 653	98	Impervious
653	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	40	0.1600	2.05		Sheet Flow, n= 0.015 P2= 3.20"
0.3	40	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-7: New 1925 ECDLL Lower Driveway



Summary for Subcatchment SC-8: New 1925 ECDLL Garage Entry Driveway and Turnaround

[49] Hint: $T_c < 2dt$ may require smaller dt

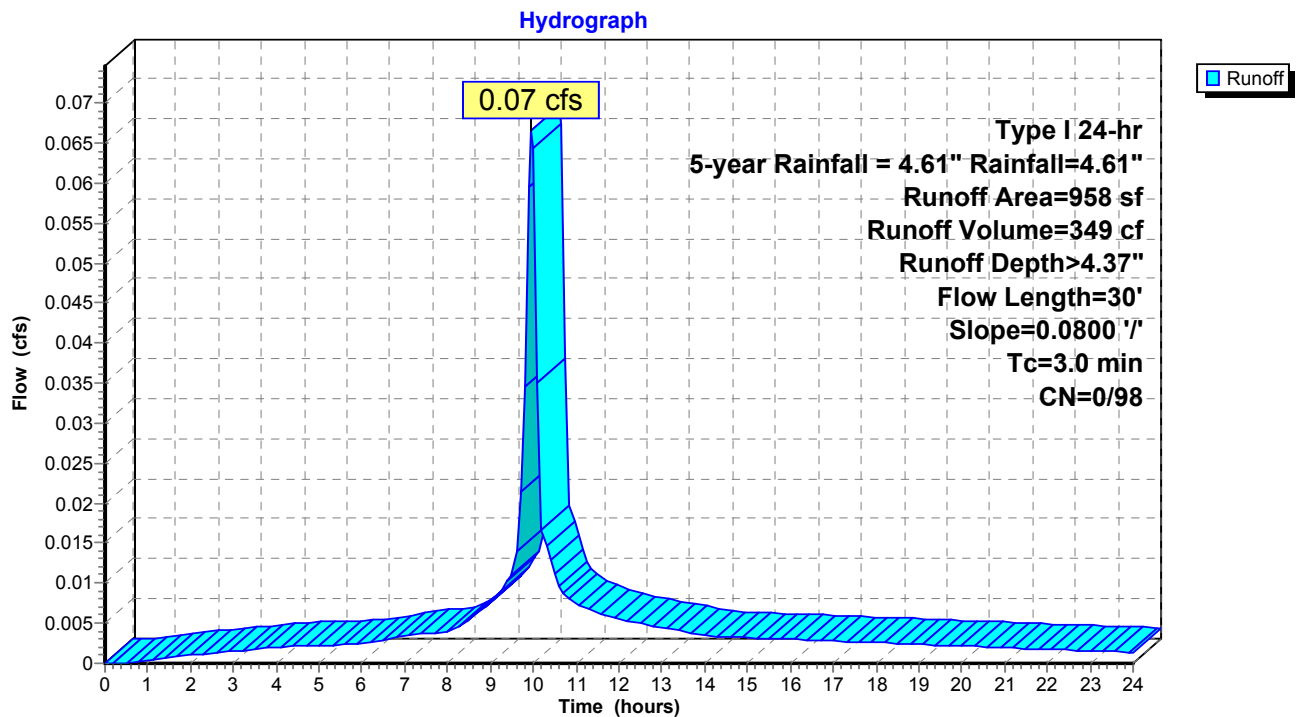
Runoff = 0.07 cfs @ 9.96 hrs, Volume= 349 cf, Depth> 4.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
* 958	98	Impervious
958	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0800	1.47		Sheet Flow, n= 0.015 P2= 3.20"
0.3	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-8: New 1925 ECDLL Garage Entry Driveway and Turnaround



Summary for Pond 5P: Catch Basin

[57] Hint: Peaked at 127.09' (Flood elevation advised)

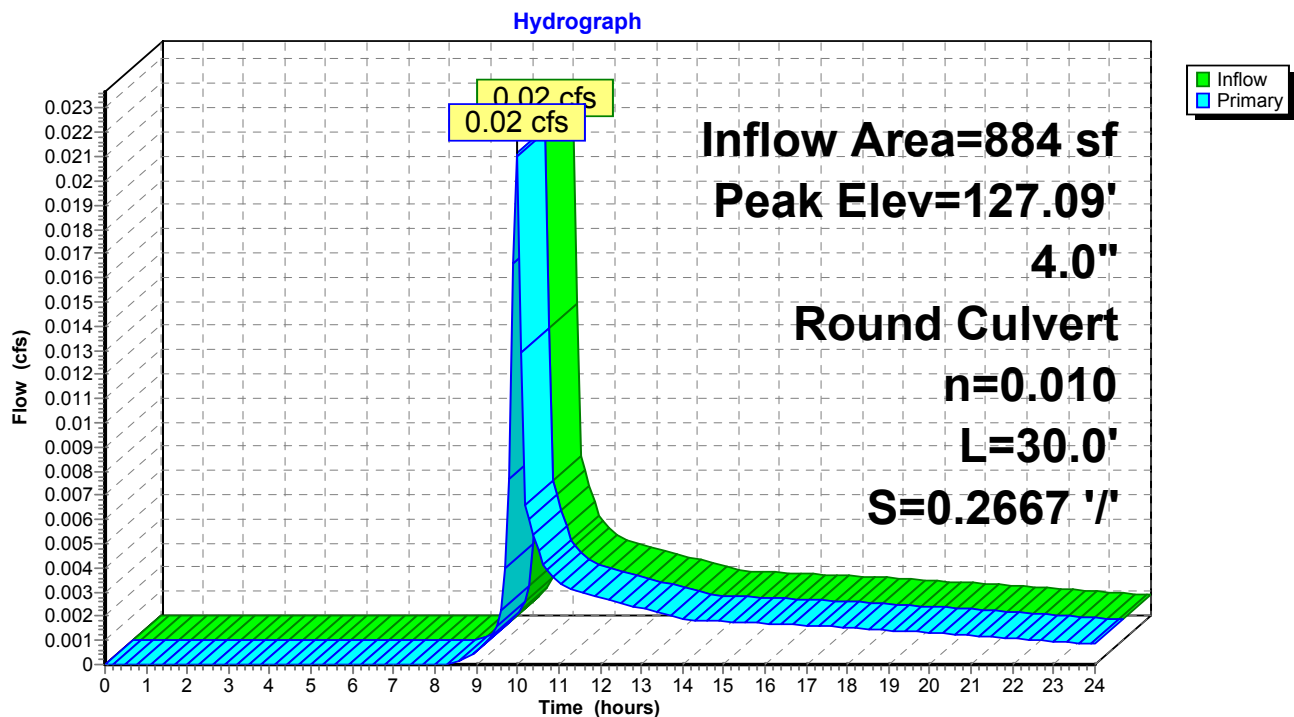
Inflow Area = 884 sf, 0.00% Impervious, Inflow Depth > 1.61" for 5-year Rainfall = 4.61" event
 Inflow = 0.02 cfs @ 9.99 hrs, Volume= 118 cf
 Outflow = 0.02 cfs @ 9.99 hrs, Volume= 118 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.99 hrs, Volume= 118 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 127.09' @ 9.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	127.00'	4.0" Round Culvert L= 30.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 127.00' / 119.00' S= 0.2667 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.99 hrs HW=127.09' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.02 cfs @ 1.03 fps)

Pond 5P: Catch Basin



Summary for Pond 6P: New Driveway CB

[57] Hint: Peaked at 128.72' (Flood elevation advised)

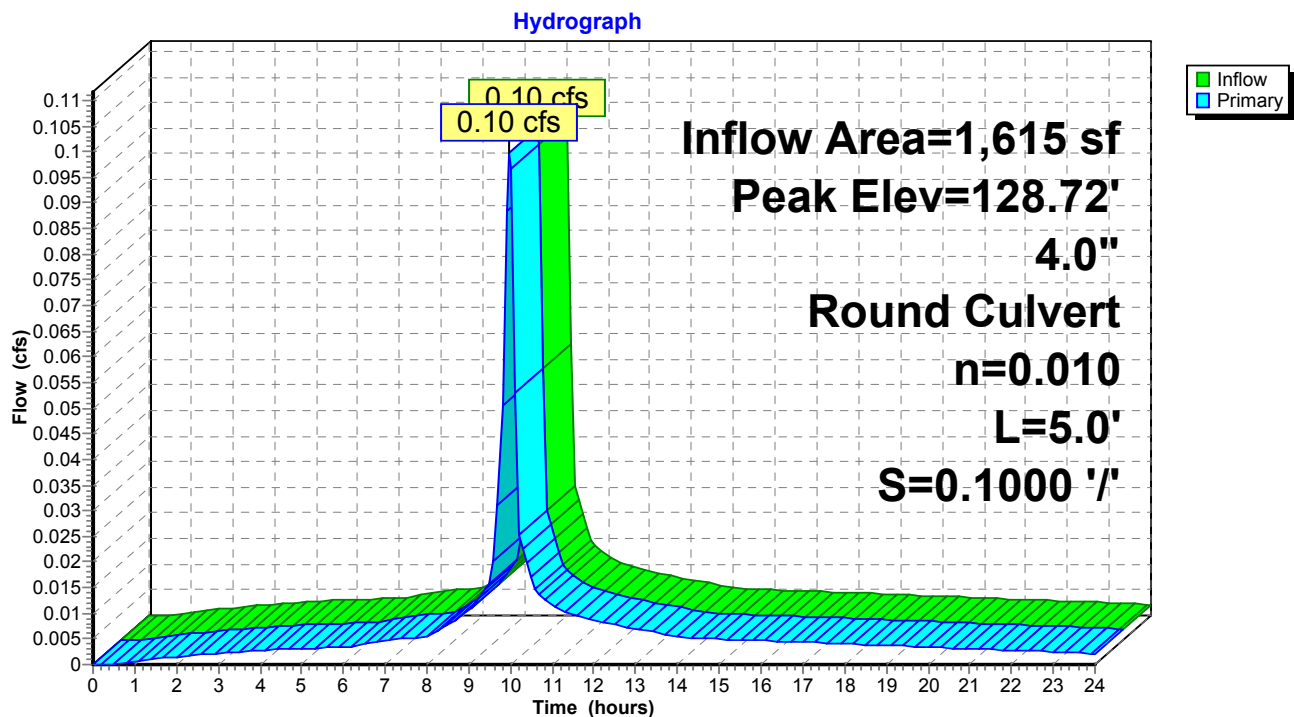
Inflow Area = 1,615 sf, 82.97% Impervious, Inflow Depth > 3.90" for 5-year Rainfall = 4.61" event
 Inflow = 0.10 cfs @ 9.97 hrs, Volume= 525 cf
 Outflow = 0.10 cfs @ 9.97 hrs, Volume= 525 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.10 cfs @ 9.97 hrs, Volume= 525 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 128.72' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	128.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.50' / 128.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.09 cfs @ 9.97 hrs HW=128.71' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.09 cfs @ 1.58 fps)

Pond 6P: New Driveway CB



Summary for Pond 7P: Trench Drain CB-7

[57] Hint: Peaked at 121.64' (Flood elevation advised)

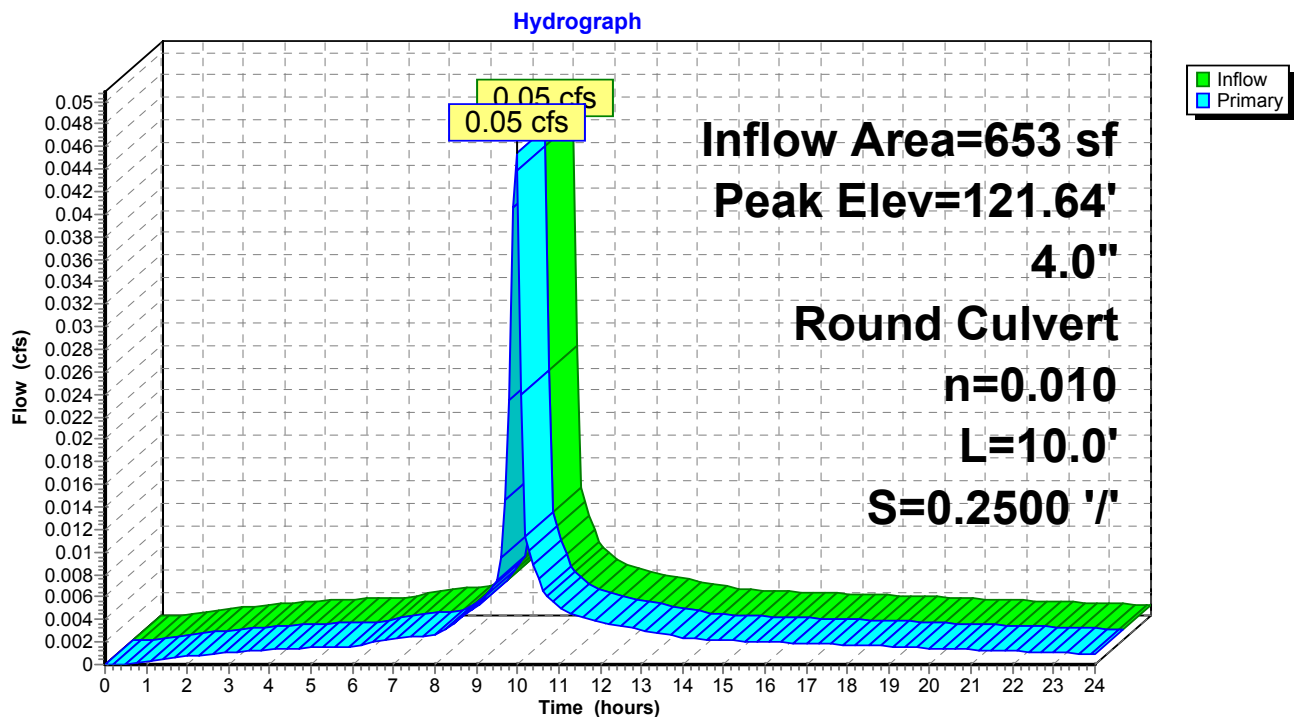
Inflow Area = 653 sf, 100.00% Impervious, Inflow Depth > 4.37" for 5-year Rainfall = 4.61" event
 Inflow = 0.05 cfs @ 9.96 hrs, Volume= 238 cf
 Outflow = 0.05 cfs @ 9.96 hrs, Volume= 238 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 9.96 hrs, Volume= 238 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 121.64' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	4.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.50' / 119.00' S= 0.2500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.04 cfs @ 9.96 hrs HW=121.64' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.04 cfs @ 1.26 fps)

Pond 7P: Trench Drain CB-7



Summary for Pond 8P: Trench Drain CB-8

[57] Hint: Peaked at 119.68' (Flood elevation advised)

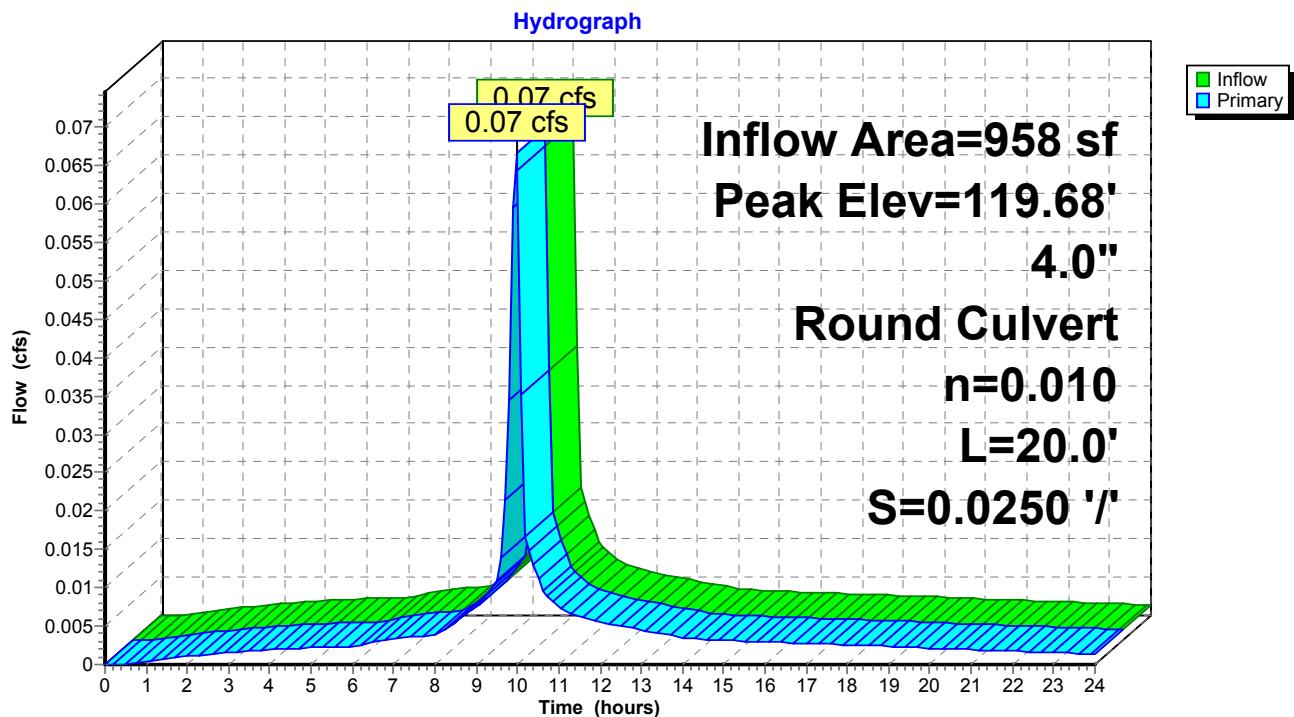
Inflow Area = 958 sf, 100.00% Impervious, Inflow Depth > 4.37" for 5-year Rainfall = 4.61" event
 Inflow = 0.07 cfs @ 9.96 hrs, Volume= 349 cf
 Outflow = 0.07 cfs @ 9.96 hrs, Volume= 349 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.07 cfs @ 9.96 hrs, Volume= 349 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 119.68' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	119.50'	4.0" Round Culvert L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.50' / 119.00' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.06 cfs @ 9.96 hrs HW=119.67' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.06 cfs @ 1.40 fps)

Pond 8P: Trench Drain CB-8



Summary for Pond 13P: Catch Basin

[57] Hint: Peaked at 119.21' (Flood elevation advised)

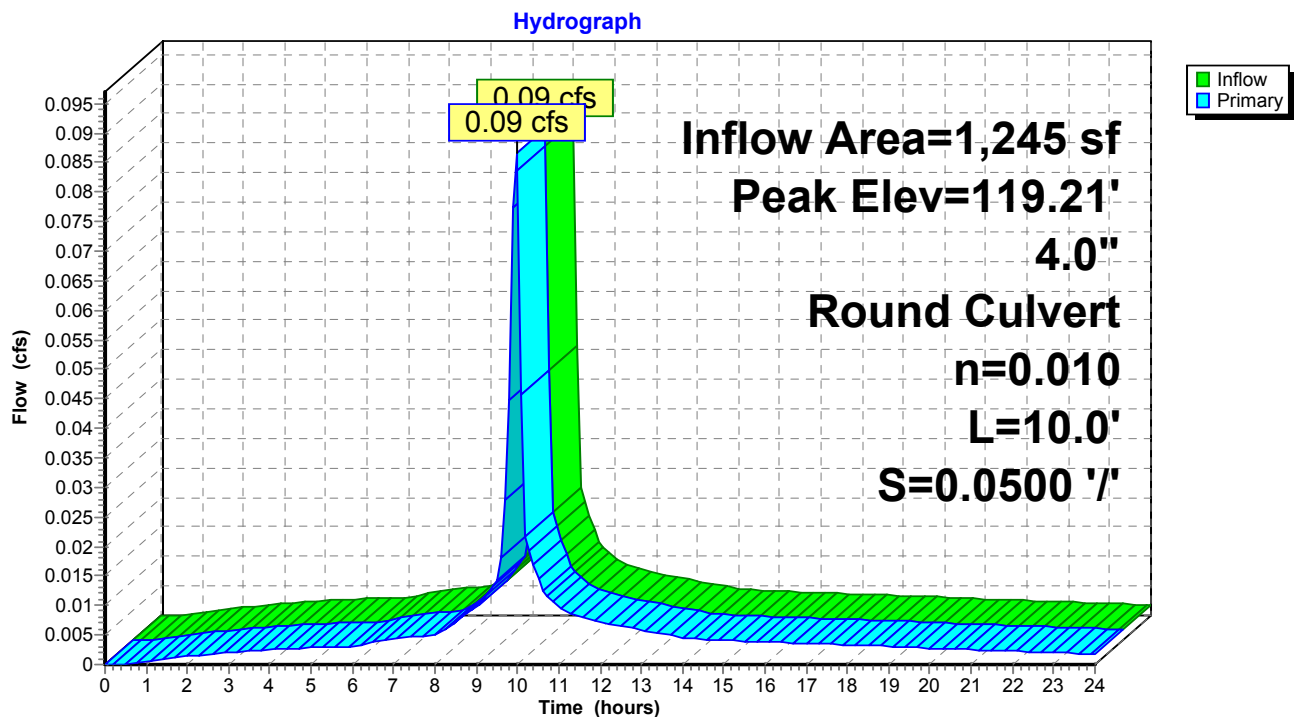
Inflow Area = 1,245 sf, 100.00% Impervious, Inflow Depth > 4.37" for 5-year Rainfall = 4.61" event
 Inflow = 0.09 cfs @ 9.96 hrs, Volume= 453 cf
 Outflow = 0.09 cfs @ 9.96 hrs, Volume= 453 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.09 cfs @ 9.96 hrs, Volume= 453 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 119.21' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	119.00'	4.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.00' / 118.50' S= 0.0500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.08 cfs @ 9.96 hrs HW=119.20' (Free Discharge)
 1=Culvert (Inlet Controls 0.08 cfs @ 1.51 fps)

Pond 13P: Catch Basin



Summary for Pond WST-1: Water Storage Tank -1

Inflow Area = 1,615 sf, 82.97% Impervious, Inflow Depth > 3.90" for 5-year Rainfall = 4.61" event
 Inflow = 0.10 cfs @ 9.97 hrs, Volume= 525 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 123.61' @ 24.00 hrs Surf.Area= 144 sf Storage= 524 cf

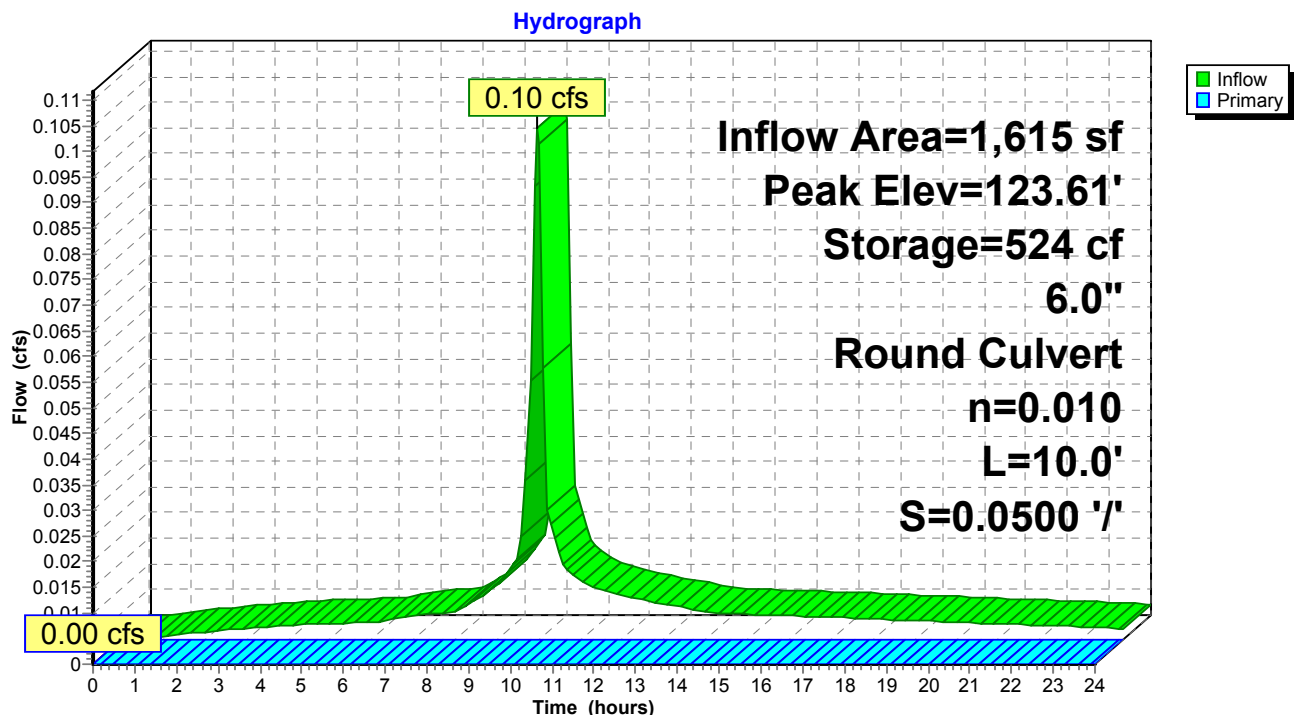
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	1,018 cf	108.0" Round Pipe Storage L= 16.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	127.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 127.50' / 127.00' S= 0.0500 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=119.00' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-1: Water Storage Tank -1



Summary for Pond WST-2: Water Storage Tank - 2

Inflow Area = 3,740 sf, 76.36% Impervious, Inflow Depth > 3.72" for 5-year Rainfall = 4.61" event
 Inflow = 0.22 cfs @ 9.97 hrs, Volume= 1,159 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 115.26' @ 24.00 hrs Surf.Area= 266 sf Storage= 1,158 cf

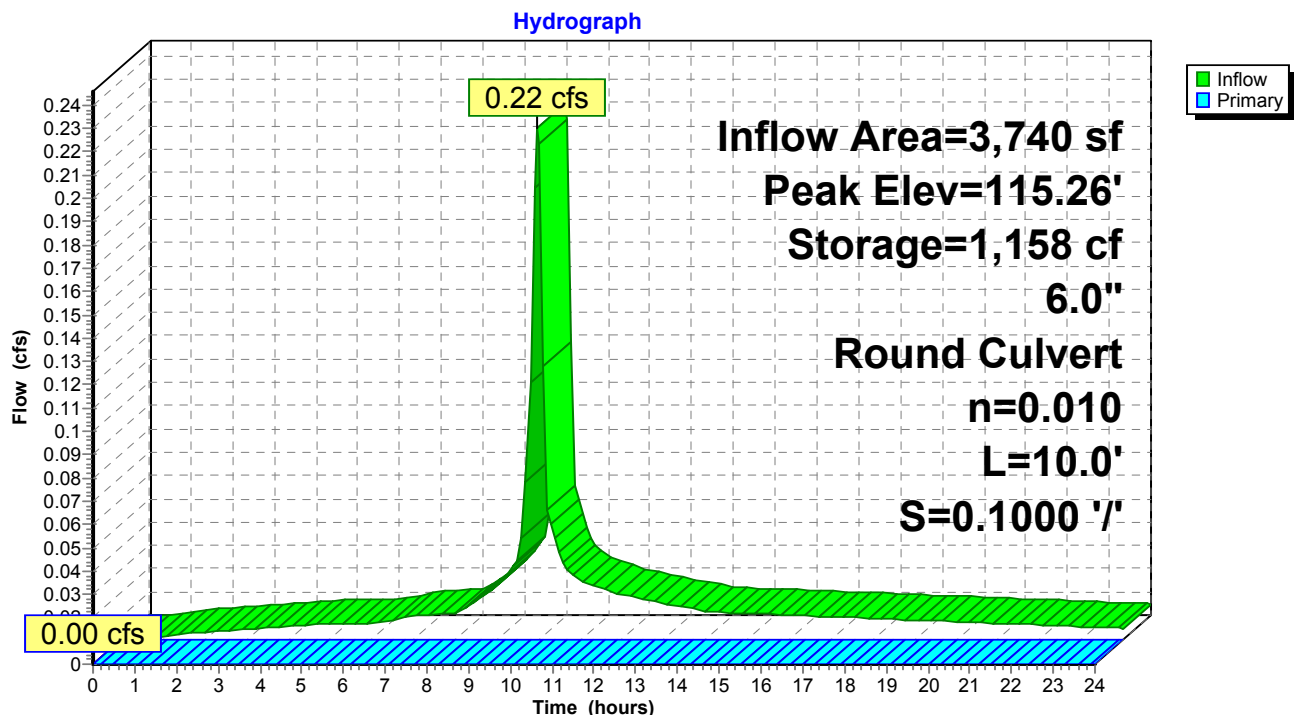
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	110.00'	1,909 cf	108.0" Round Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	118.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 118.50' / 117.50' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=110.00' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-2: Water Storage Tank - 2



1925 ECDLL_Post Construction Analysis Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Prepared by CSA

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-13: House Runoff Area=1,245 sf 100.00% Impervious Runoff Depth>5.31"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.10 cfs 551 cf

Subcatchment SC-5: Upper Private Open Runoff Area=884 sf 0.00% Impervious Runoff Depth>2.28"
Flow Length=30' Slope=0.1000 '/ Tc=3.0 min CN=68/0 Runoff=0.03 cfs 168 cf

Subcatchment SC-6: Widened 1925 ECDLL Runoff Area=1,615 sf 82.97% Impervious Runoff Depth>4.79"
Flow Length=160' Slope=0.0700 '/ Tc=3.0 min CN=68/98 Runoff=0.12 cfs 645 cf

Subcatchment SC-7: New 1925 ECDLL Runoff Area=653 sf 100.00% Impervious Runoff Depth>5.31"
Flow Length=40' Slope=0.1600 '/ Tc=3.0 min CN=0/98 Runoff=0.05 cfs 289 cf

Subcatchment SC-8: New 1925 ECDLL Runoff Area=958 sf 100.00% Impervious Runoff Depth>5.31"
Flow Length=30' Slope=0.0800 '/ Tc=3.0 min CN=0/98 Runoff=0.08 cfs 424 cf

Pond 5P: Catch Basin Peak Elev=127.12' Inflow=0.03 cfs 168 cf
4.0" Round Culvert n=0.010 L=30.0' S=0.2667 '/ Outflow=0.03 cfs 168 cf

Pond 6P: New Driveway CB Peak Elev=128.75' Inflow=0.12 cfs 645 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/ Outflow=0.12 cfs 645 cf

Pond 7P: Trench Drain CB-7 Peak Elev=121.66' Inflow=0.05 cfs 289 cf
4.0" Round Culvert n=0.010 L=10.0' S=0.2500 '/ Outflow=0.05 cfs 289 cf

Pond 8P: Trench Drain CB-8 Peak Elev=119.70' Inflow=0.08 cfs 424 cf
4.0" Round Culvert n=0.010 L=20.0' S=0.0250 '/ Outflow=0.08 cfs 424 cf

Pond 13P: Catch Basin Peak Elev=119.23' Inflow=0.10 cfs 551 cf
4.0" Round Culvert n=0.010 L=10.0' S=0.0500 '/ Outflow=0.10 cfs 551 cf

Pond WST-1: Water Storage Tank -1 Peak Elev=124.45' Storage=645 cf Inflow=0.12 cfs 645 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.0500 '/ Outflow=0.00 cfs 0 cf

Pond WST-2: Water Storage Tank -2 Peak Elev=116.31' Storage=1,430 cf Inflow=0.27 cfs 1,431 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.1000 '/ Outflow=0.00 cfs 0 cf

Total Runoff Area = 5,355 sf Runoff Volume = 2,076 cf Average Runoff Depth = 4.65"
21.64% Pervious = 1,159 sf 78.36% Impervious = 4,196 sf

Summary for Subcatchment SC-13: House Entry/Foyer/Garage Roof and the Foyer Deck

[49] Hint: $T_c < 2dt$ may require smaller dt

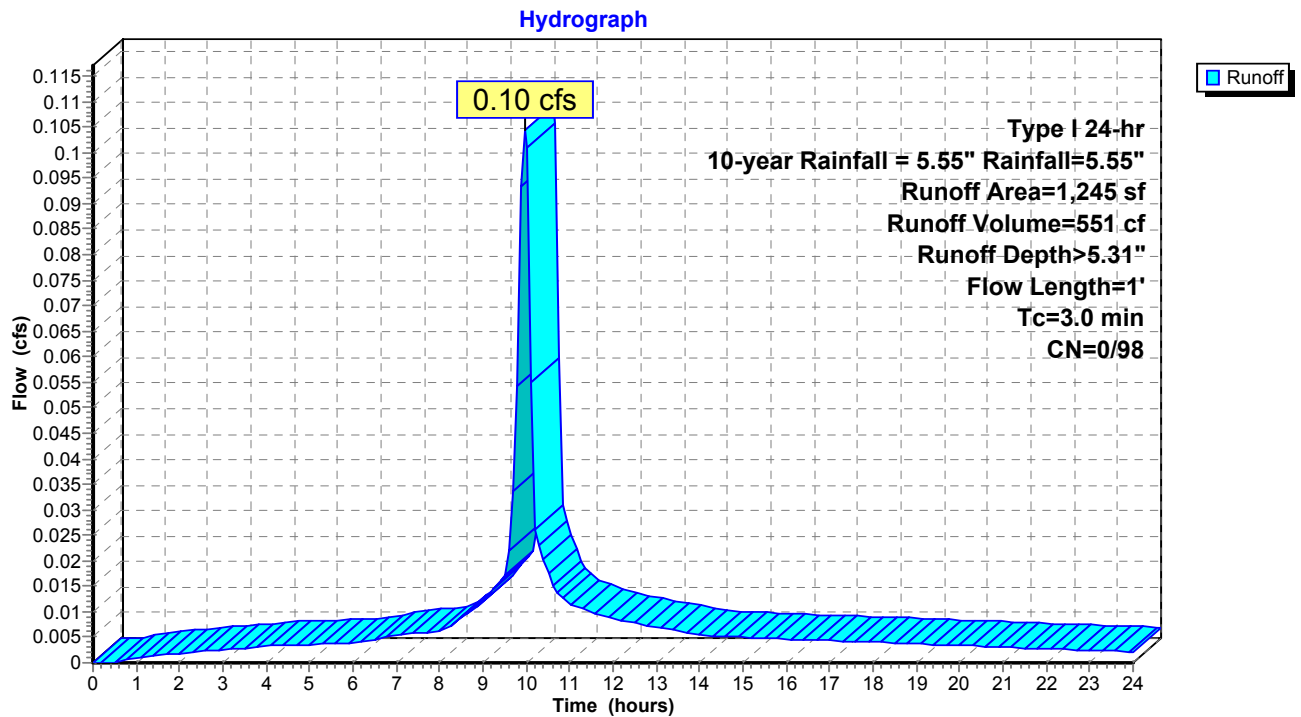
Runoff = 0.10 cfs @ 9.96 hrs, Volume= 551 cf, Depth> 5.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
* 1,245	98	Impervious
1,245	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-13: House Entry/Foyer/Garage Roof and the Foyer Deck



Summary for Subcatchment SC-5: Upper Private Open Space

[49] Hint: $T_c < 2dt$ may require smaller dt

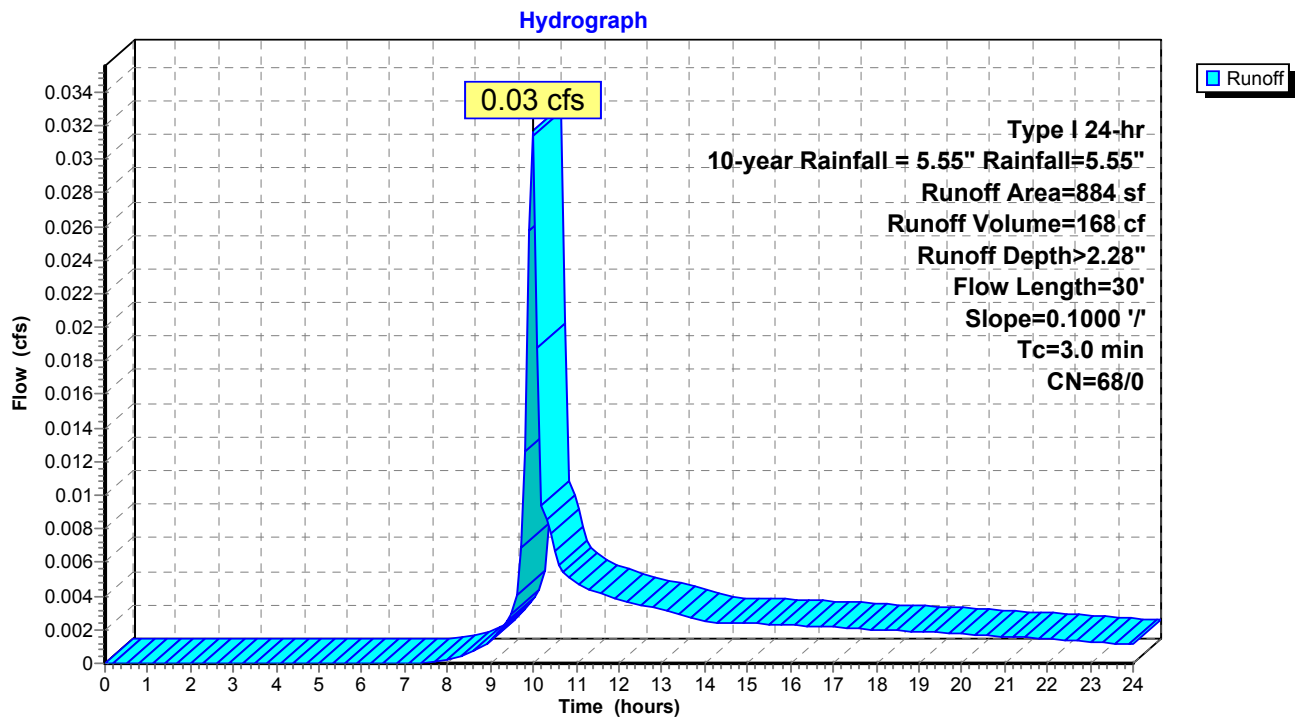
Runoff = 0.03 cfs @ 9.98 hrs, Volume= 168 cf, Depth> 2.28"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
884	68	<50% Grass cover, Poor, HSG A
884	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	30	0.1000	2.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.2	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-5: Upper Private Open Space



Summary for Subcatchment SC-6: Widened 1925 ECDLL driveway and adjacent easterly vegetated side yard

[49] Hint: $T_c < 2dt$ may require smaller dt

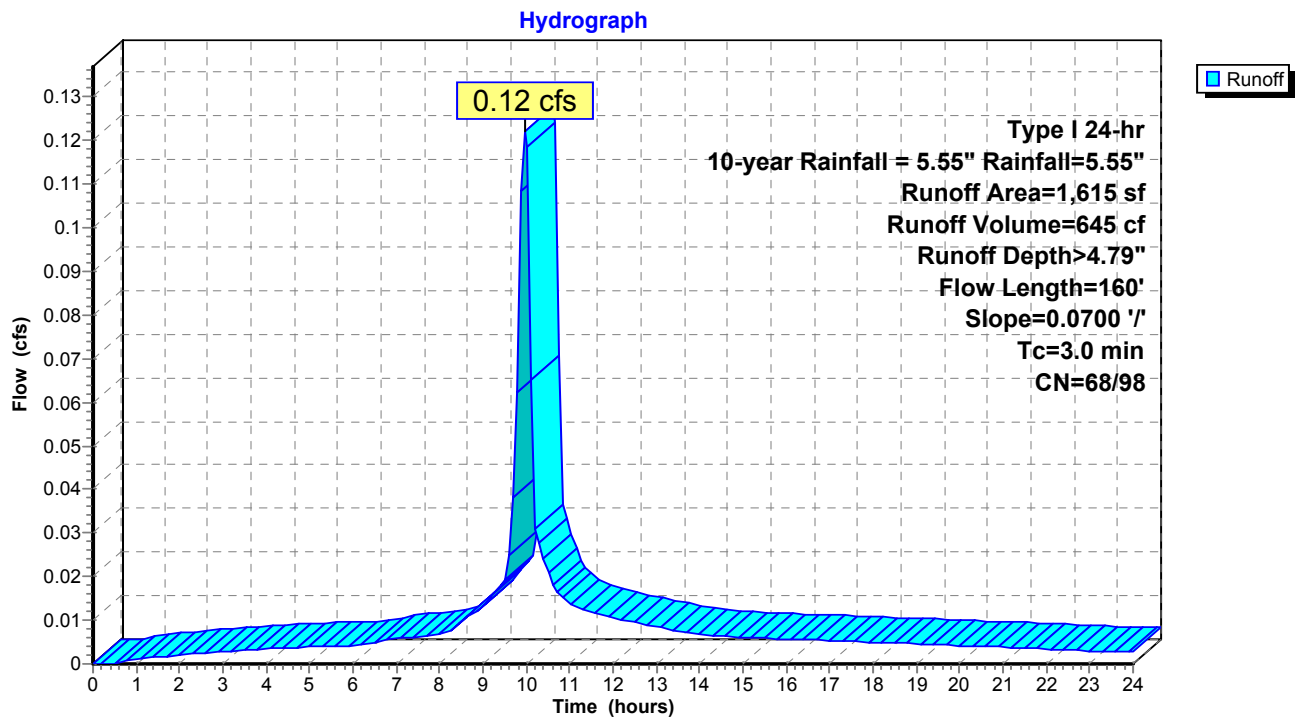
Runoff = 0.12 cfs @ 9.97 hrs, Volume= 645 cf, Depth> 4.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
* 1,340	98	Impervious
275	68	<50% Grass cover, Poor, HSG A
1,615	93	Weighted Average
275	68	17.03% Pervious Area
1,340	98	82.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	160	0.0700	1.95		Sheet Flow, n= 0.015 P2= 3.20"
1.4	160	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-6: Widened 1925 ECDLL driveway and adjacent easterly vegetated side yard



Summary for Subcatchment SC-7: New 1925 ECDLL Lower Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

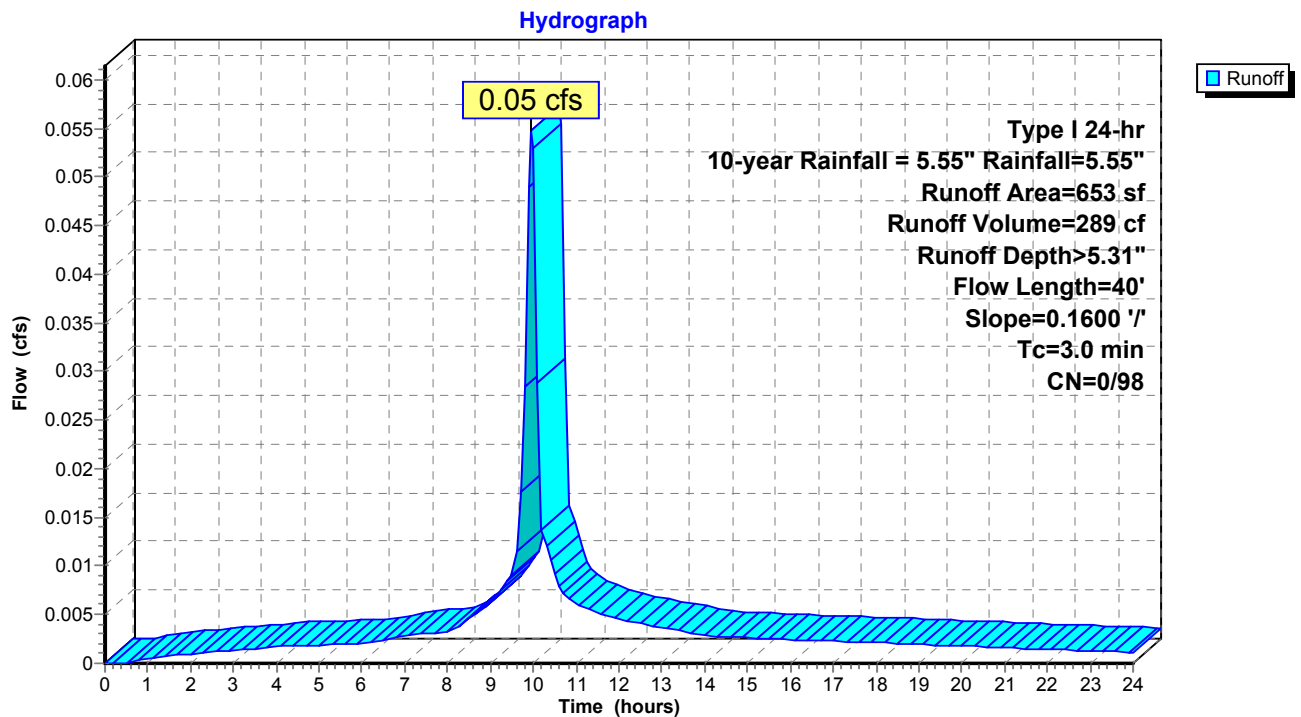
Runoff = 0.05 cfs @ 9.96 hrs, Volume= 289 cf, Depth> 5.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
* 653	98	Impervious
653	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	40	0.1600	2.05		Sheet Flow, n= 0.015 P2= 3.20"
0.3	40	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-7: New 1925 ECDLL Lower Driveway



Summary for Subcatchment SC-8: New 1925 ECDLL Garage Entry Driveway and Turnaround

[49] Hint: $T_c < 2dt$ may require smaller dt

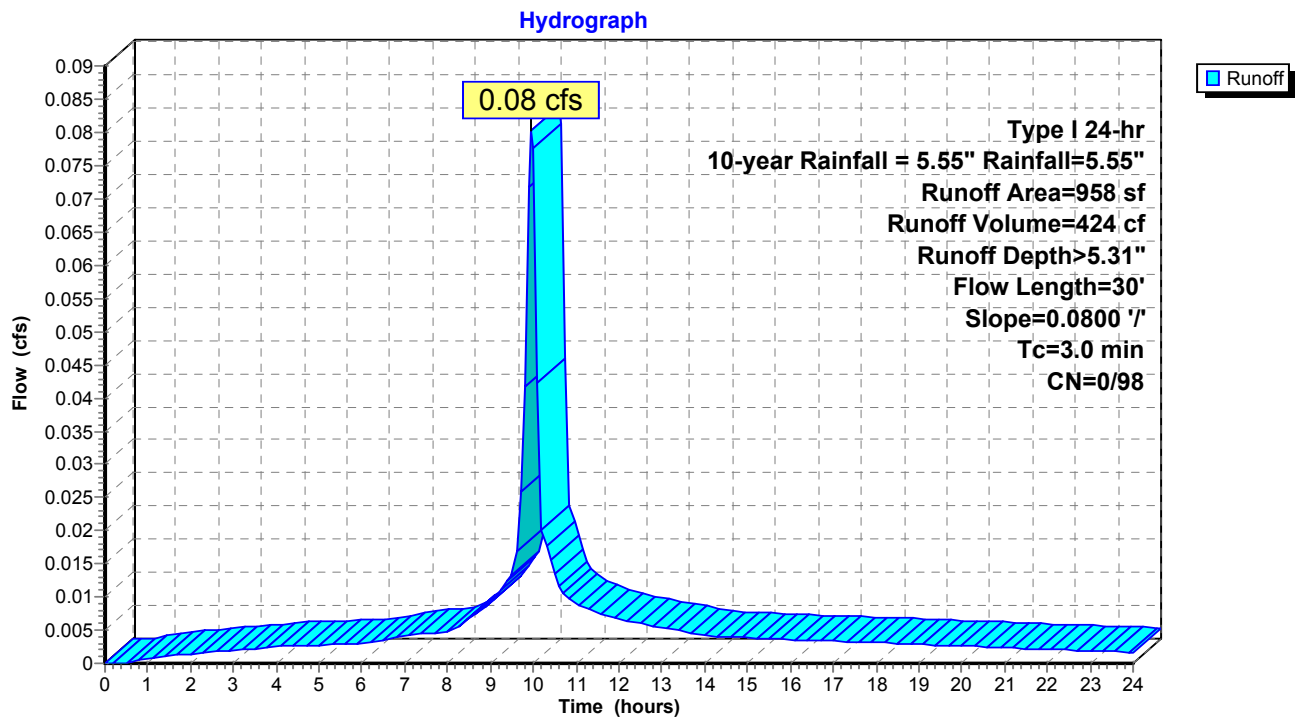
Runoff = 0.08 cfs @ 9.96 hrs, Volume= 424 cf, Depth> 5.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
* 958	98	Impervious
958	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0800	1.47		Sheet Flow, n= 0.015 P2= 3.20"
0.3	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-8: New 1925 ECDLL Garage Entry Driveway and Turnaround



Summary for Pond 5P: Catch Basin

[57] Hint: Peaked at 127.12' (Flood elevation advised)

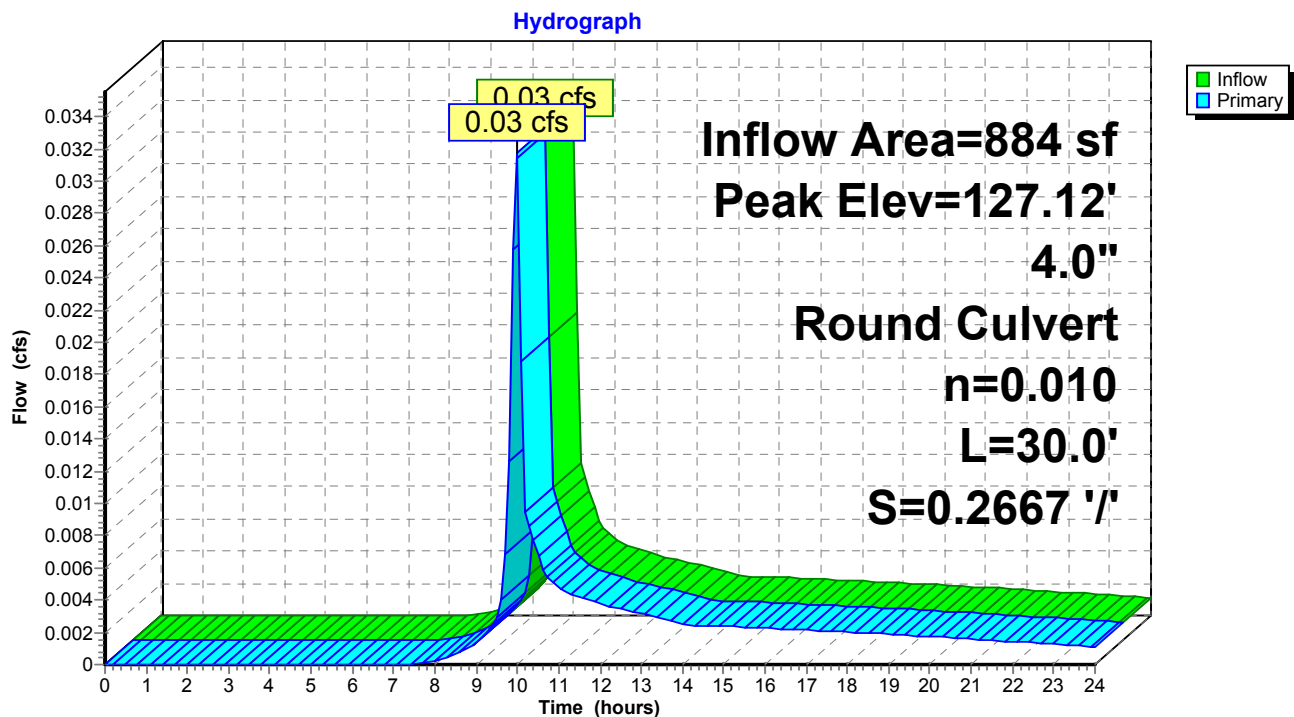
Inflow Area = 884 sf, 0.00% Impervious, Inflow Depth > 2.28" for 10-year Rainfall = 5.55" event
 Inflow = 0.03 cfs @ 9.98 hrs, Volume= 168 cf
 Outflow = 0.03 cfs @ 9.98 hrs, Volume= 168 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.03 cfs @ 9.98 hrs, Volume= 168 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 127.12' @ 9.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	127.00'	4.0" Round Culvert L= 30.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 127.00' / 119.00' S= 0.2667 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.03 cfs @ 9.98 hrs HW=127.11' (Free Discharge)
 1=Culvert (Inlet Controls 0.03 cfs @ 1.15 fps)

Pond 5P: Catch Basin



Summary for Pond 6P: New Driveway CB

[57] Hint: Peaked at 128.75' (Flood elevation advised)

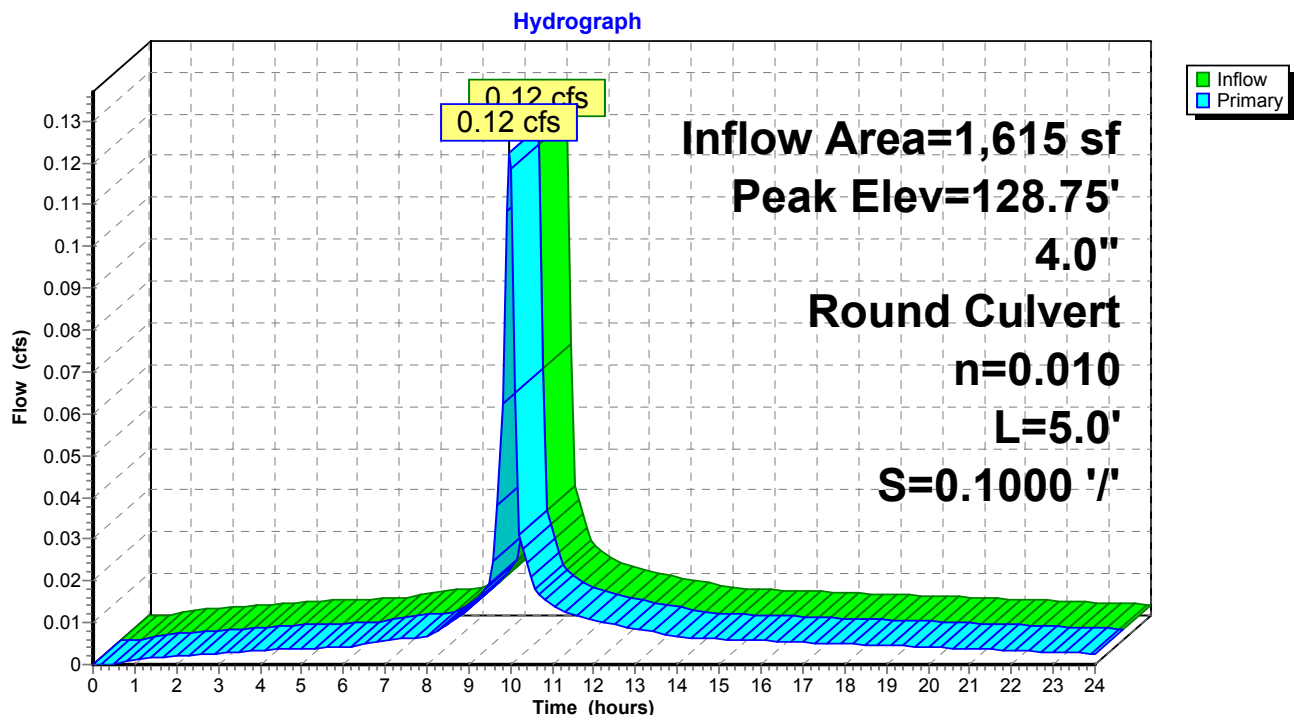
Inflow Area = 1,615 sf, 82.97% Impervious, Inflow Depth > 4.79" for 10-year Rainfall = 5.55" event
 Inflow = 0.12 cfs @ 9.97 hrs, Volume= 645 cf
 Outflow = 0.12 cfs @ 9.97 hrs, Volume= 645 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.12 cfs @ 9.97 hrs, Volume= 645 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 128.75' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	128.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.50' / 128.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.12 cfs @ 9.97 hrs HW=128.74' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.12 cfs @ 1.68 fps)

Pond 6P: New Driveway CB



Summary for Pond 7P: Trench Drain CB-7

[57] Hint: Peaked at 121.66' (Flood elevation advised)

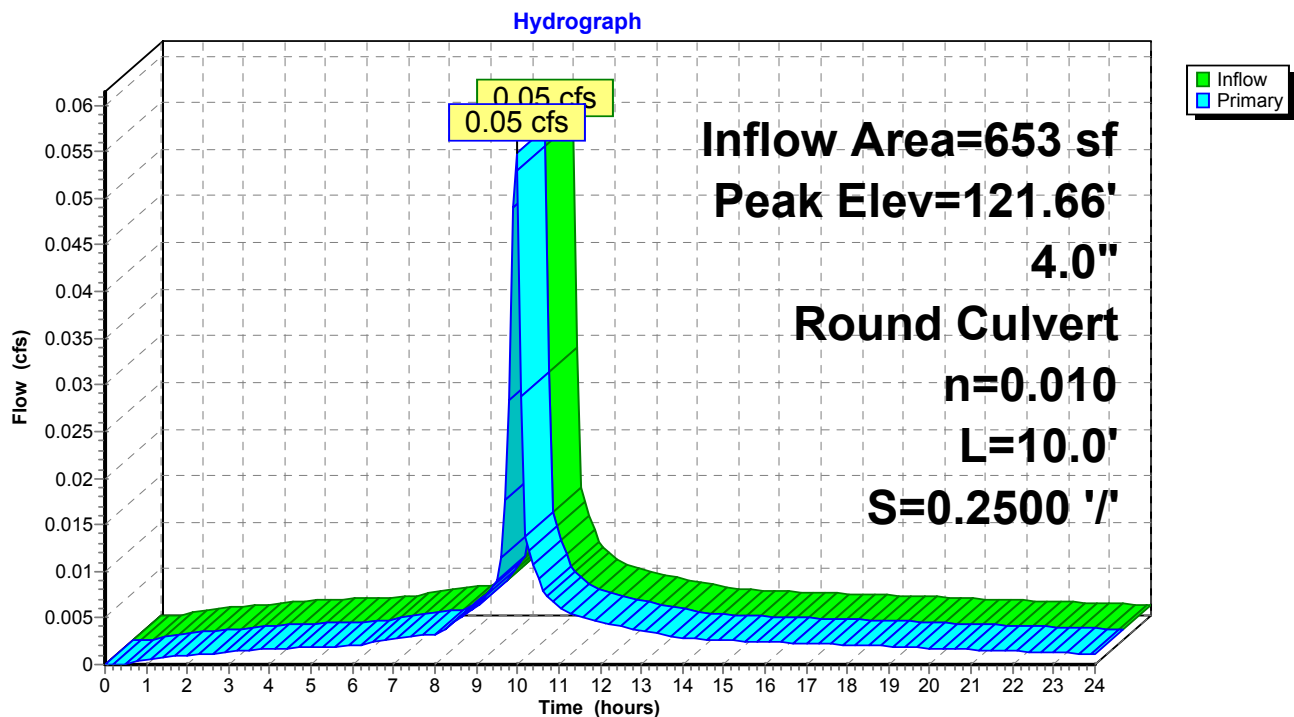
Inflow Area = 653 sf, 100.00% Impervious, Inflow Depth > 5.31" for 10-year Rainfall = 5.55" event
 Inflow = 0.05 cfs @ 9.96 hrs, Volume= 289 cf
 Outflow = 0.05 cfs @ 9.96 hrs, Volume= 289 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 9.96 hrs, Volume= 289 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 121.66' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	4.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.50' / 119.00' S= 0.2500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.05 cfs @ 9.96 hrs HW=121.65' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.05 cfs @ 1.33 fps)

Pond 7P: Trench Drain CB-7



Summary for Pond 8P: Trench Drain CB-8

[57] Hint: Peaked at 119.70' (Flood elevation advised)

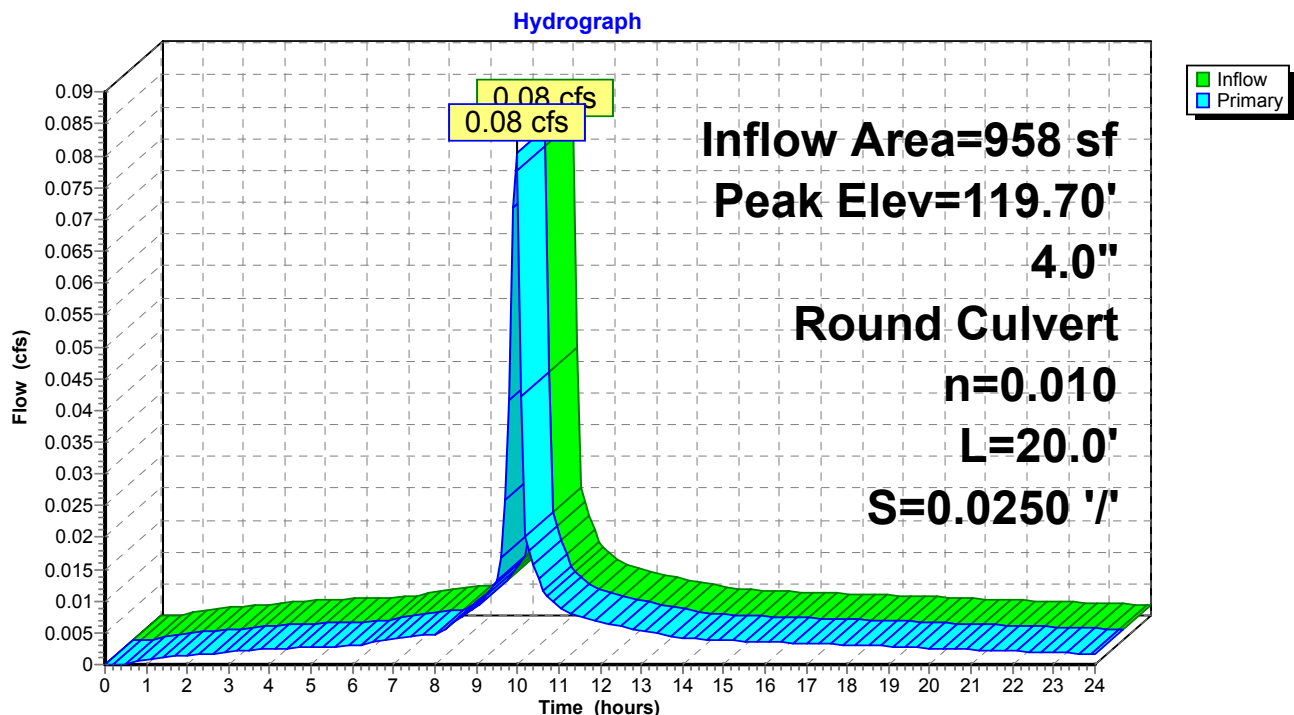
Inflow Area = 958 sf, 100.00% Impervious, Inflow Depth > 5.31" for 10-year Rainfall = 5.55" event
 Inflow = 0.08 cfs @ 9.96 hrs, Volume= 424 cf
 Outflow = 0.08 cfs @ 9.96 hrs, Volume= 424 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.08 cfs @ 9.96 hrs, Volume= 424 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 119.70' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	119.50'	4.0" Round Culvert L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.50' / 119.00' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.08 cfs @ 9.96 hrs HW=119.69' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.08 cfs @ 1.48 fps)

Pond 8P: Trench Drain CB-8



Summary for Pond 13P: Catch Basin

[57] Hint: Peaked at 119.23' (Flood elevation advised)

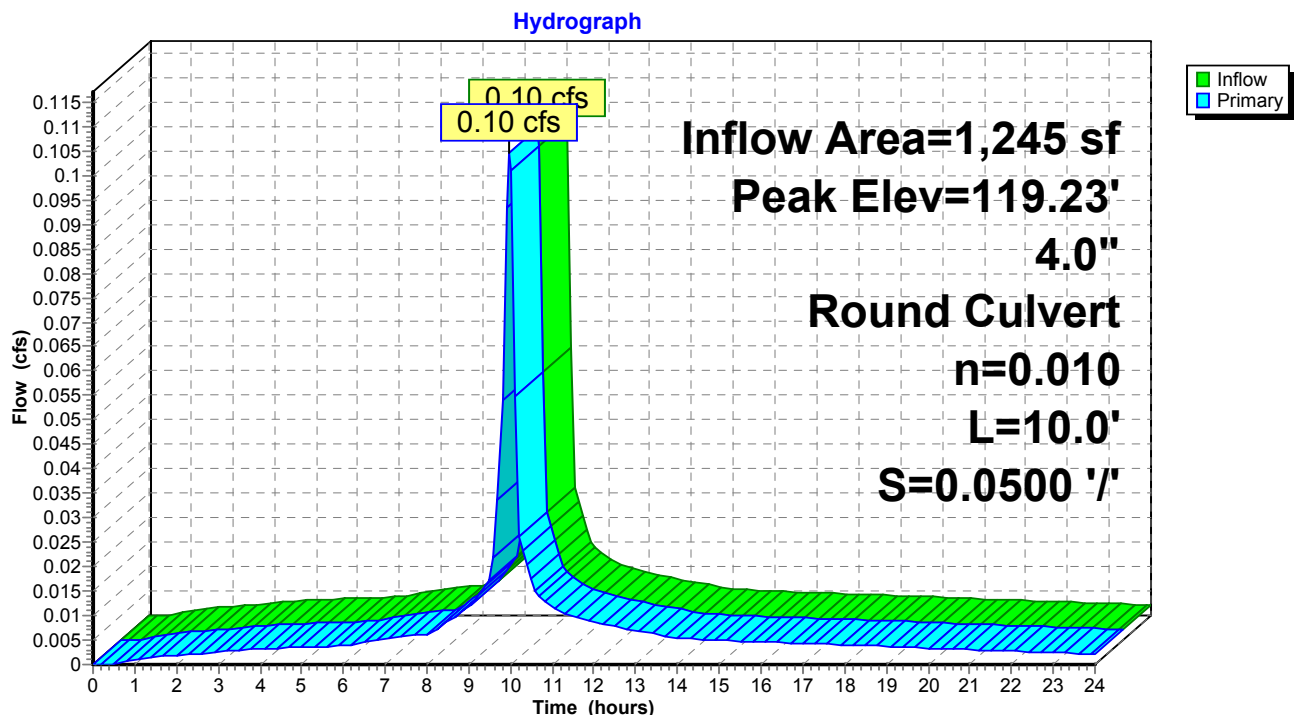
Inflow Area = 1,245 sf, 100.00% Impervious, Inflow Depth > 5.31" for 10-year Rainfall = 5.55" event
 Inflow = 0.10 cfs @ 9.96 hrs, Volume= 551 cf
 Outflow = 0.10 cfs @ 9.96 hrs, Volume= 551 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.10 cfs @ 9.96 hrs, Volume= 551 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 119.23' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	119.00'	4.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.00' / 118.50' S= 0.0500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.10 cfs @ 9.96 hrs HW=119.22' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.10 cfs @ 1.60 fps)

Pond 13P: Catch Basin



Summary for Pond WST-1: Water Storage Tank -1

Inflow Area = 1,615 sf, 82.97% Impervious, Inflow Depth > 4.79" for 10-year Rainfall = 5.55" event
 Inflow = 0.12 cfs @ 9.97 hrs, Volume= 645 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 124.45' @ 24.00 hrs Surf.Area= 141 sf Storage= 645 cf

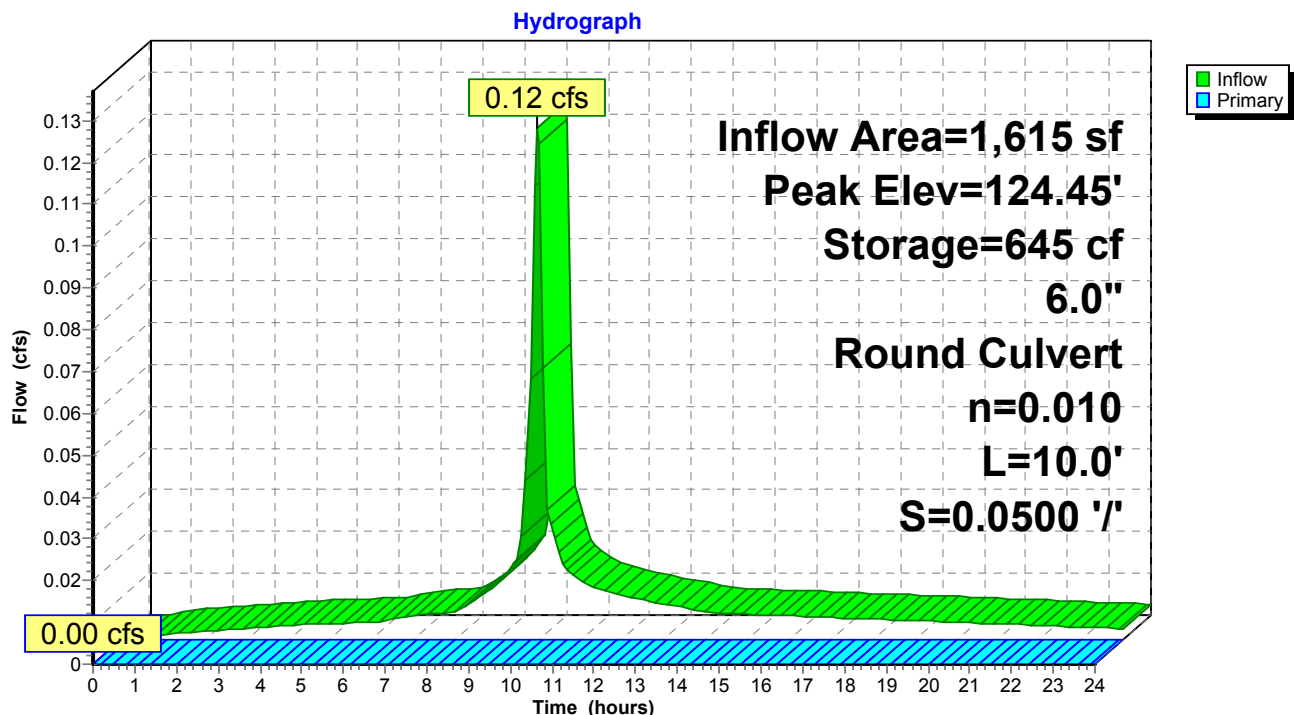
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	1,018 cf	108.0" Round Pipe Storage L= 16.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	127.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 127.50' / 127.00' S= 0.0500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=119.00' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-1: Water Storage Tank -1



Summary for Pond WST-2: Water Storage Tank - 2

Inflow Area = 3,740 sf, 76.36% Impervious, Inflow Depth > 4.59" for 10-year Rainfall = 5.55" event
 Inflow = 0.27 cfs @ 9.97 hrs, Volume= 1,431 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 116.31' @ 24.00 hrs Surf.Area= 247 sf Storage= 1,430 cf

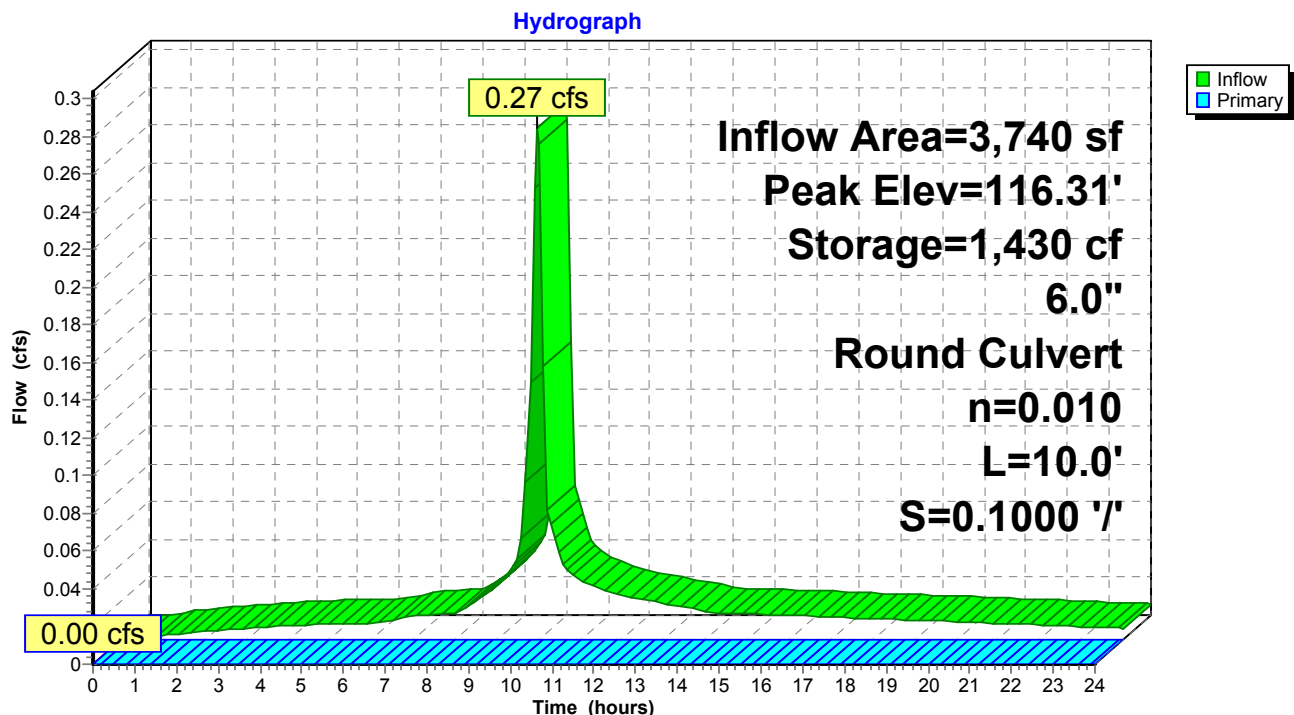
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	110.00'	1,909 cf	108.0" Round Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	118.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 118.50' / 117.50' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=110.00' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-2: Water Storage Tank - 2



1925 ECDLL_Post Construction Analysis Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Prepared by CSA

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-13: House

Runoff Area=1,245 sf 100.00% Impervious Runoff Depth>6.47"

Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.13 cfs 671 cf

Subcatchment SC-5: Upper Private Open

Runoff Area=884 sf 0.00% Impervious Runoff Depth>3.17"

Flow Length=30' Slope=0.1000 '/ Tc=3.0 min CN=68/0 Runoff=0.05 cfs 234 cf

Subcatchment SC-6: Widened 1925 ECDLL

Runoff Area=1,615 sf 82.97% Impervious Runoff Depth>5.91"

Flow Length=160' Slope=0.0700 '/ Tc=3.0 min CN=68/98 Runoff=0.15 cfs 795 cf

Subcatchment SC-7: New 1925 ECDLL

Runoff Area=653 sf 100.00% Impervious Runoff Depth>6.47"

Flow Length=40' Slope=0.1600 '/ Tc=3.0 min CN=0/98 Runoff=0.07 cfs 352 cf

Subcatchment SC-8: New 1925 ECDLL

Runoff Area=958 sf 100.00% Impervious Runoff Depth>6.47"

Flow Length=30' Slope=0.0800 '/ Tc=3.0 min CN=0/98 Runoff=0.10 cfs 516 cf

Pond 5P: Catch Basin

Peak Elev=127.14' Inflow=0.05 cfs 234 cf

4.0" Round Culvert n=0.010 L=30.0' S=0.2667 '/ Outflow=0.05 cfs 234 cf

Pond 6P: New Driveway CB

Peak Elev=128.79' Inflow=0.15 cfs 795 cf

4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/ Outflow=0.15 cfs 795 cf

Pond 7P: Trench Drain CB-7

Peak Elev=121.68' Inflow=0.07 cfs 352 cf

4.0" Round Culvert n=0.010 L=10.0' S=0.2500 '/ Outflow=0.07 cfs 352 cf

Pond 8P: Trench Drain CB-8

Peak Elev=119.72' Inflow=0.10 cfs 516 cf

4.0" Round Culvert n=0.010 L=20.0' S=0.0250 '/ Outflow=0.10 cfs 516 cf

Pond 13P: Catch Basin

Peak Elev=119.26' Inflow=0.13 cfs 671 cf

4.0" Round Culvert n=0.010 L=10.0' S=0.0500 '/ Outflow=0.13 cfs 671 cf

Pond WST-1: Water Storage Tank -1

Peak Elev=125.56' Storage=794 cf Inflow=0.15 cfs 795 cf

6.0" Round Culvert n=0.010 L=10.0' S=0.0500 '/ Outflow=0.00 cfs 0 cf

Pond WST-2: Water Storage Tank - 2

Peak Elev=117.88' Storage=1,772 cf Inflow=0.34 cfs 1,773 cf

6.0" Round Culvert n=0.010 L=10.0' S=0.1000 '/ Outflow=0.00 cfs 0 cf

Total Runoff Area = 5,355 sf Runoff Volume = 2,568 cf Average Runoff Depth = 5.75"**21.64% Pervious = 1,159 sf 78.36% Impervious = 4,196 sf**

Summary for Subcatchment SC-13: House Entry/Foyer/Garage Roof and the Foyer Deck

[49] Hint: $T_c < 2dt$ may require smaller dt

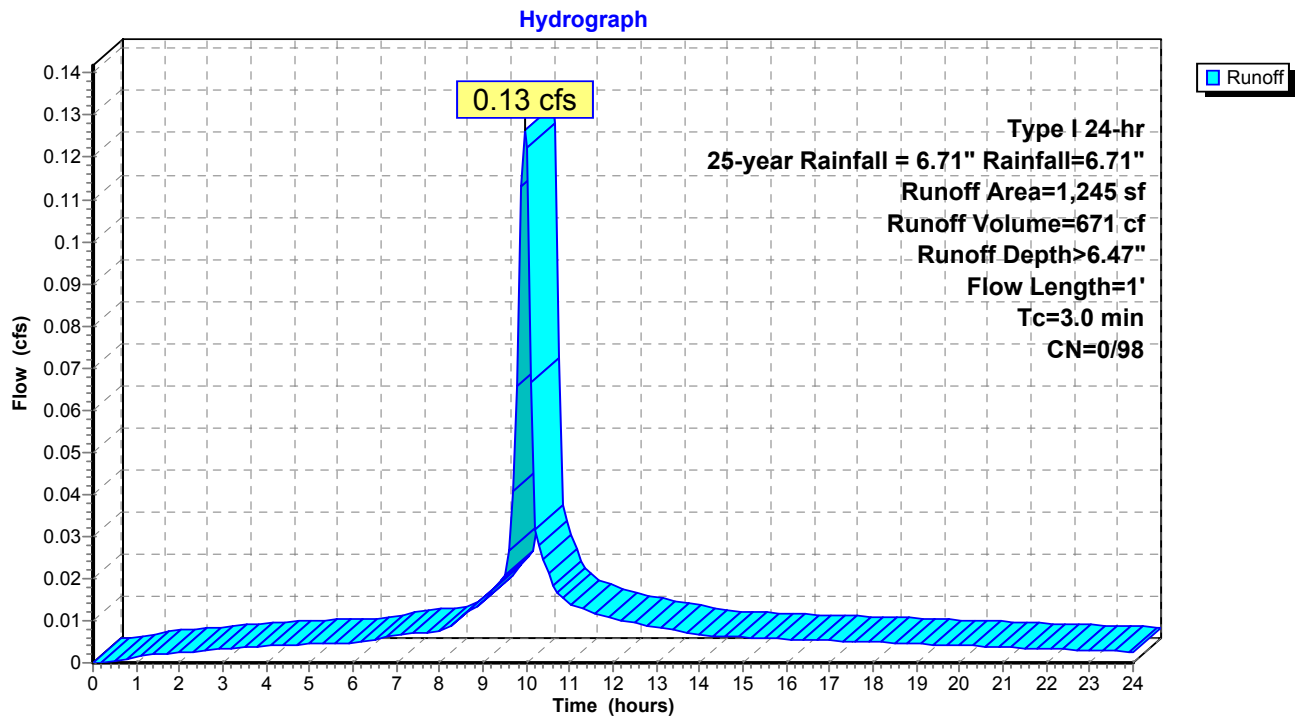
Runoff = 0.13 cfs @ 9.96 hrs, Volume= 671 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
* 1,245	98	Impervious
1,245	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-13: House Entry/Foyer/Garage Roof and the Foyer Deck



Summary for Subcatchment SC-5: Upper Private Open Space

[49] Hint: $T_c < 2dt$ may require smaller dt

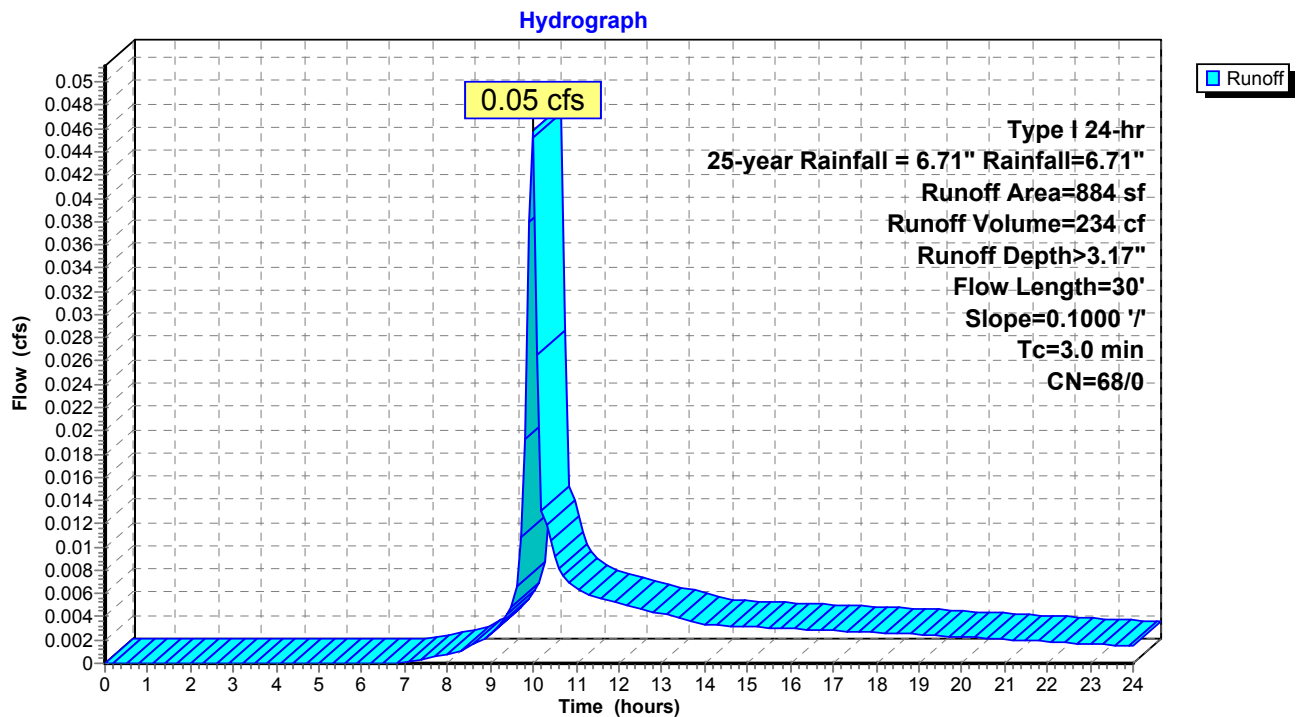
Runoff = 0.05 cfs @ 9.98 hrs, Volume= 234 cf, Depth> 3.17"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt = 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
884	68	<50% Grass cover, Poor, HSG A
884	68	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	30	0.1000	2.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.2	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-5: Upper Private Open Space



Summary for Subcatchment SC-6: Widened 1925 ECDLL driveway and adjacent easterly vegetated side yard

[49] Hint: $T_c < 2dt$ may require smaller dt

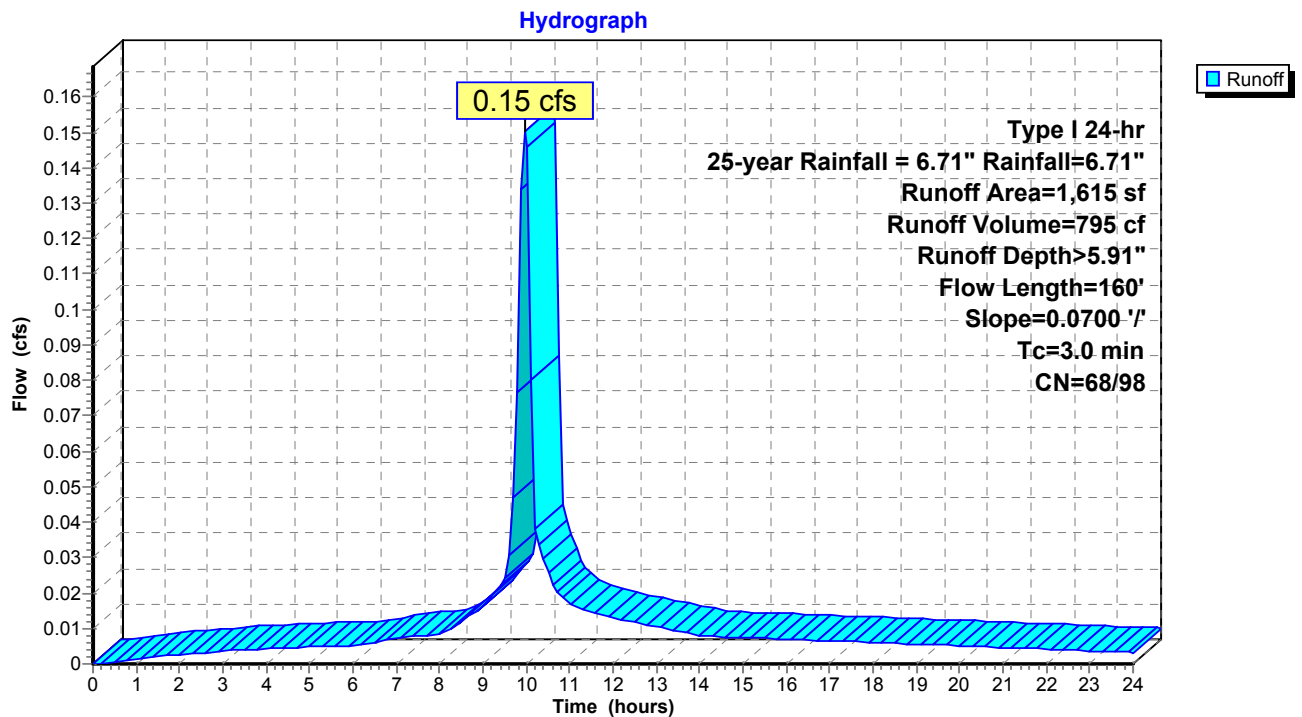
Runoff = 0.15 cfs @ 9.97 hrs, Volume= 795 cf, Depth> 5.91"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
* 1,340	98	Impervious
275	68	<50% Grass cover, Poor, HSG A
1,615	93	Weighted Average
275	68	17.03% Pervious Area
1,340	98	82.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	160	0.0700	1.95		Sheet Flow, n= 0.015 P2= 3.20"
1.4	160	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-6: Widened 1925 ECDLL driveway and adjacent easterly vegetated side yard



Summary for Subcatchment SC-7: New 1925 ECDLL Lower Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

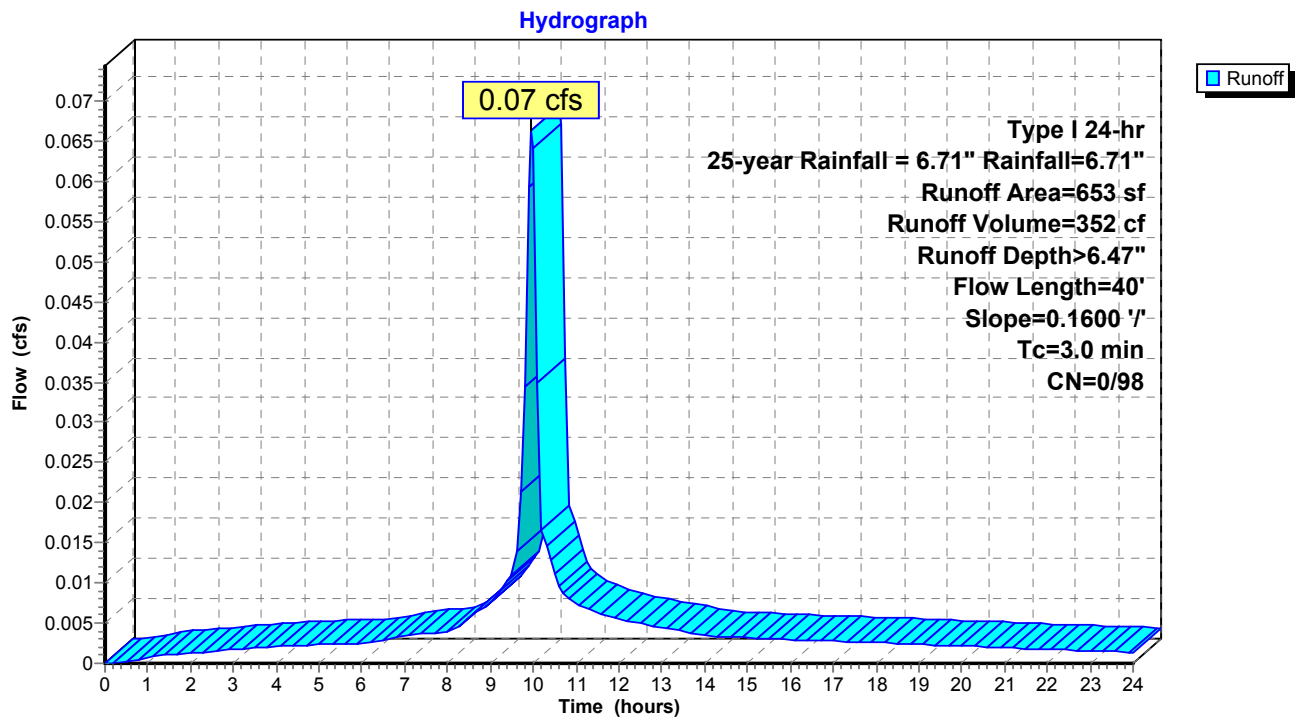
Runoff = 0.07 cfs @ 9.96 hrs, Volume= 352 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
* 653	98	Impervious
653	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	40	0.1600	2.05		Sheet Flow, n= 0.015 P2= 3.20"
0.3	40	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-7: New 1925 ECDLL Lower Driveway



Summary for Subcatchment SC-8: New 1925 ECDLL Garage Entry Driveway and Turnaround

[49] Hint: $T_c < 2dt$ may require smaller dt

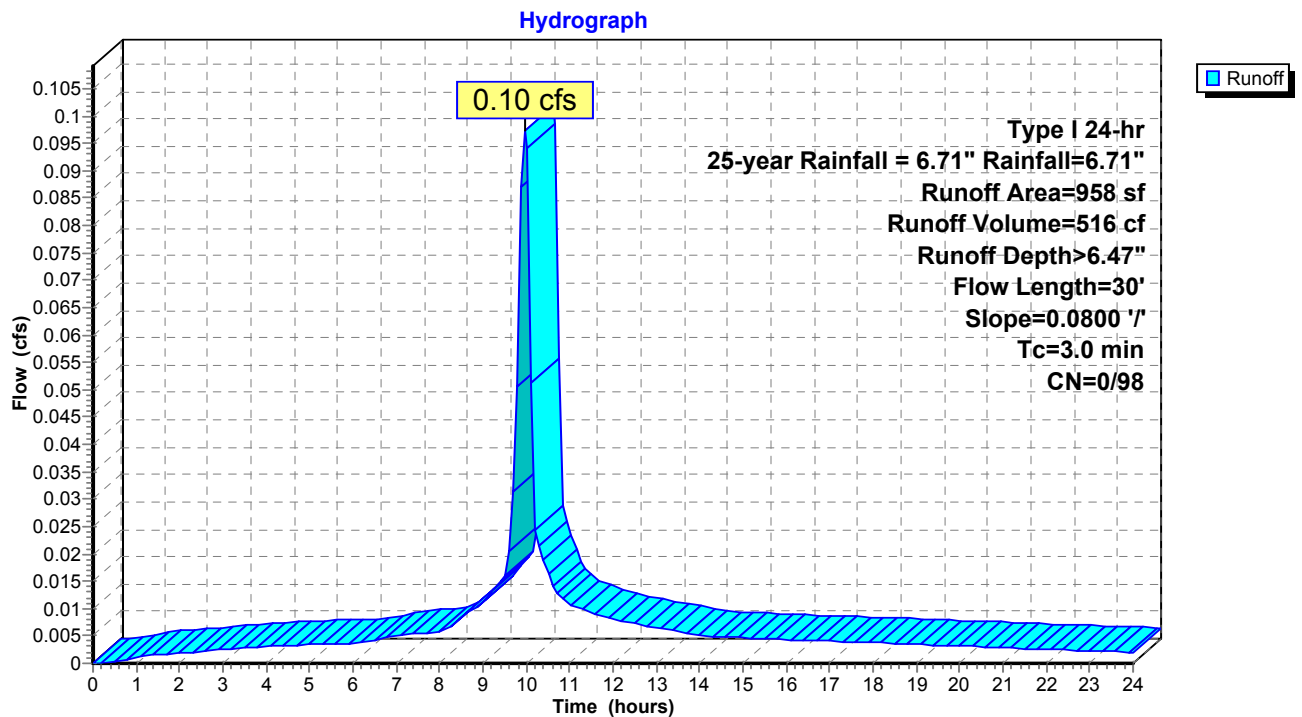
Runoff = 0.10 cfs @ 9.96 hrs, Volume= 516 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
* 958	98	Impervious
958	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	30	0.0800	1.47		Sheet Flow, n= 0.015 P2= 3.20"
0.3	30	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-8: New 1925 ECDLL Garage Entry Driveway and Turnaround



Summary for Pond 5P: Catch Basin

[57] Hint: Peaked at 127.14' (Flood elevation advised)

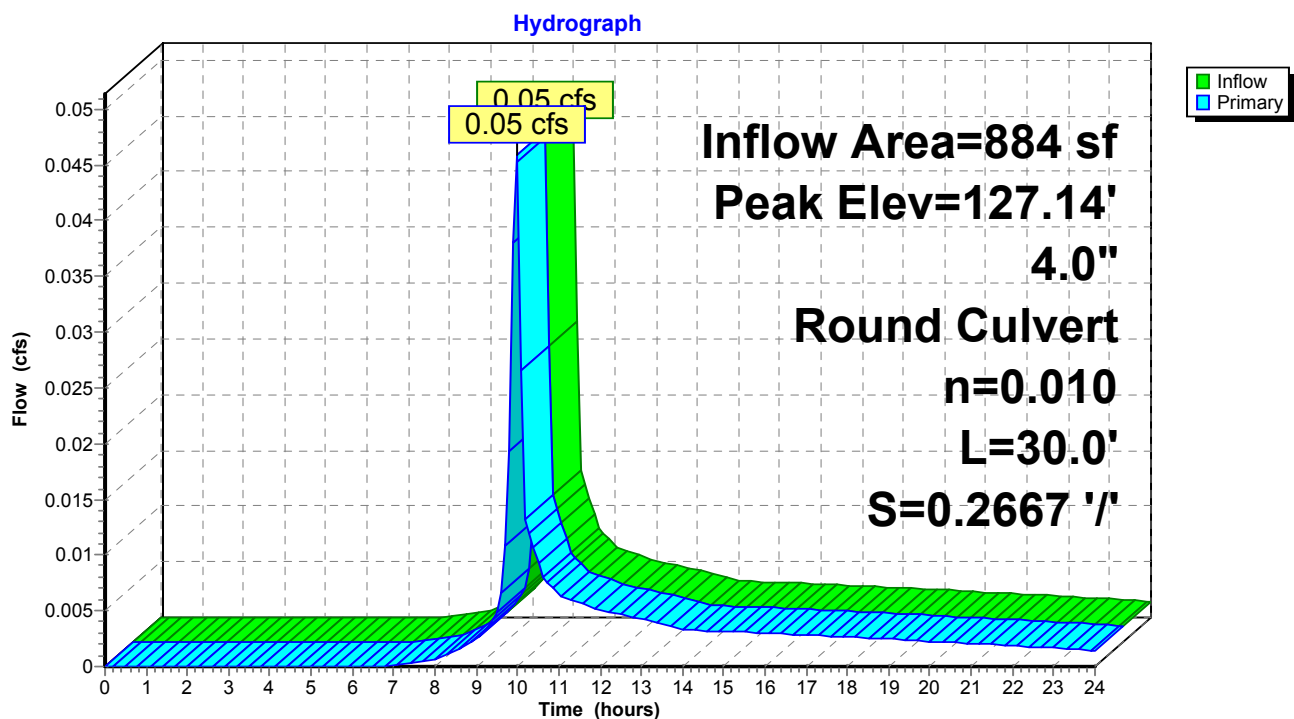
Inflow Area = 884 sf, 0.00% Impervious, Inflow Depth > 3.17" for 25-year Rainfall = 6.71" event
 Inflow = 0.05 cfs @ 9.98 hrs, Volume= 234 cf
 Outflow = 0.05 cfs @ 9.98 hrs, Volume= 234 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 9.98 hrs, Volume= 234 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 127.14' @ 9.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	127.00'	4.0" Round Culvert L= 30.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 127.00' / 119.00' S= 0.2667 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.04 cfs @ 9.98 hrs HW=127.14' (Free Discharge)
 1=Culvert (Inlet Controls 0.04 cfs @ 1.27 fps)

Pond 5P: Catch Basin



Summary for Pond 6P: New Driveway CB

[57] Hint: Peaked at 128.79' (Flood elevation advised)

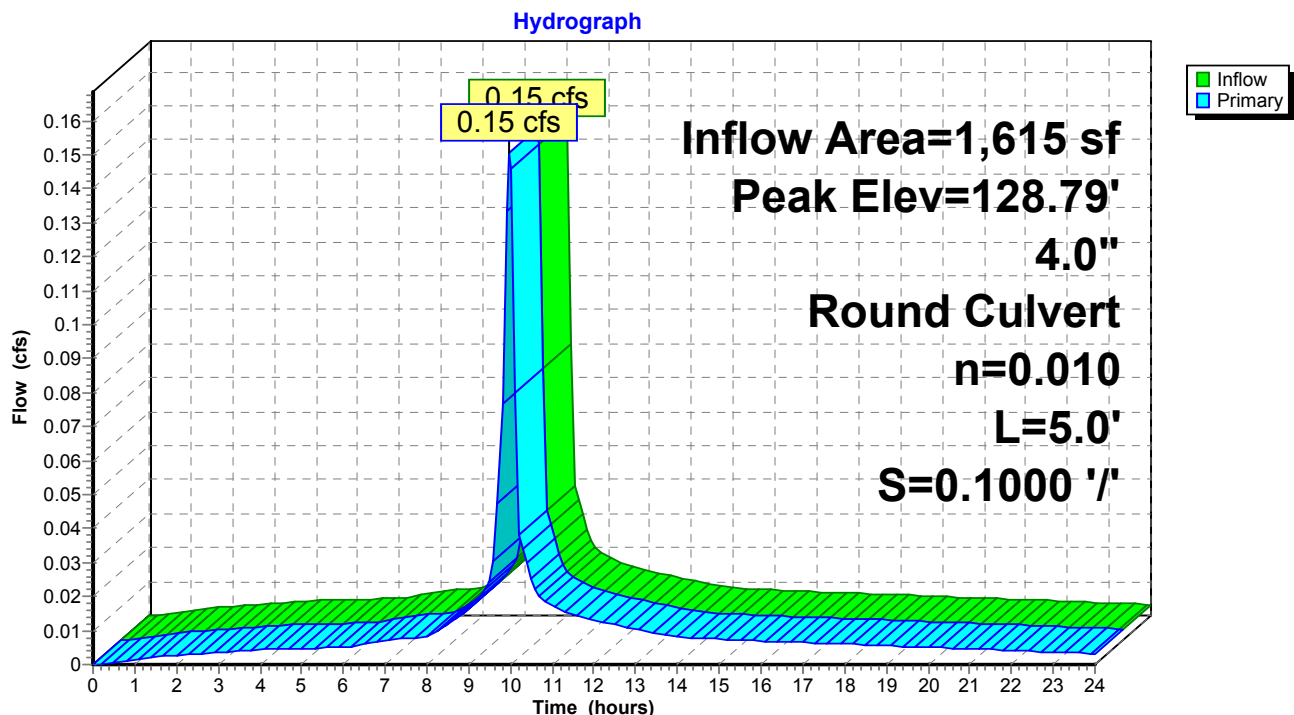
Inflow Area = 1,615 sf, 82.97% Impervious, Inflow Depth > 5.91" for 25-year Rainfall = 6.71" event
 Inflow = 0.15 cfs @ 9.97 hrs, Volume= 795 cf
 Outflow = 0.15 cfs @ 9.97 hrs, Volume= 795 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.15 cfs @ 9.97 hrs, Volume= 795 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 128.79' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	128.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.50' / 128.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.14 cfs @ 9.97 hrs HW=128.78' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.14 cfs @ 1.81 fps)

Pond 6P: New Driveway CB



Summary for Pond 7P: Trench Drain CB-7

[57] Hint: Peaked at 121.68' (Flood elevation advised)

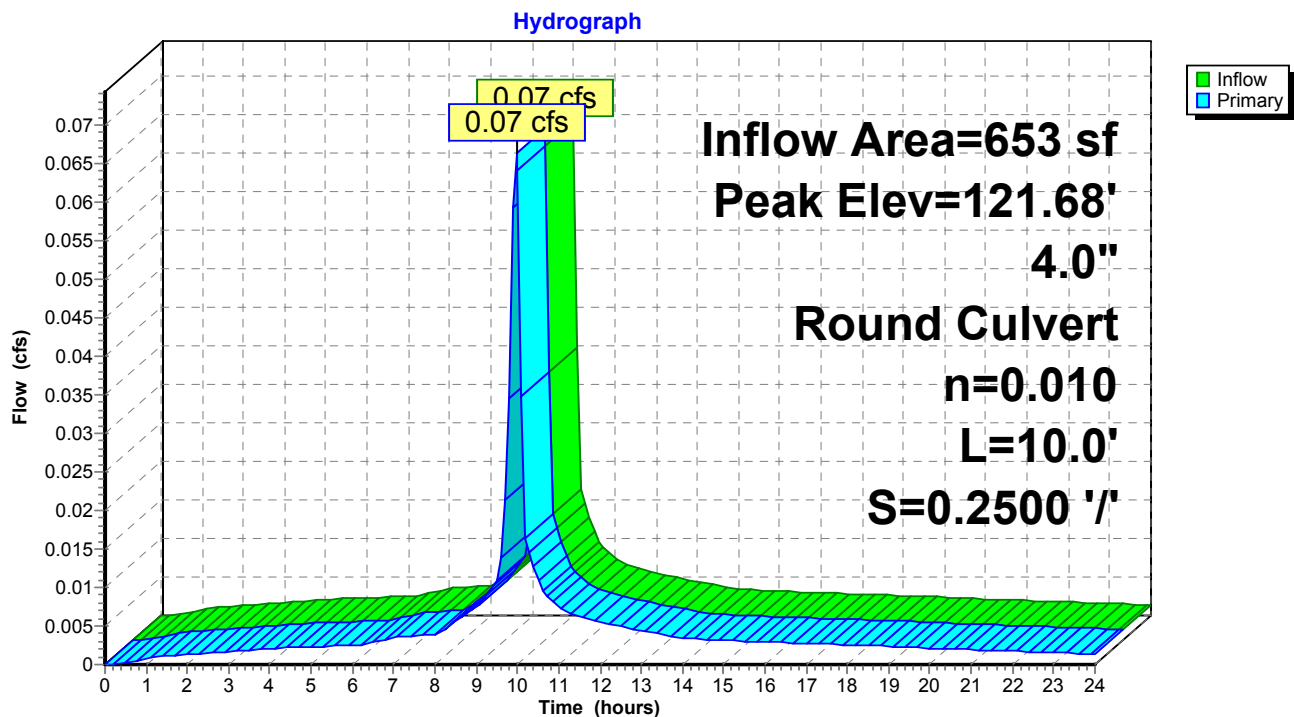
Inflow Area = 653 sf, 100.00% Impervious, Inflow Depth > 6.47" for 25-year Rainfall = 6.71" event
 Inflow = 0.07 cfs @ 9.96 hrs, Volume= 352 cf
 Outflow = 0.07 cfs @ 9.96 hrs, Volume= 352 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.07 cfs @ 9.96 hrs, Volume= 352 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 121.68' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	4.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.50' / 119.00' S= 0.2500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.06 cfs @ 9.96 hrs HW=121.67' (Free Discharge)
 1=Culvert (Inlet Controls 0.06 cfs @ 1.40 fps)

Pond 7P: Trench Drain CB-7



Summary for Pond 8P: Trench Drain CB-8

[57] Hint: Peaked at 119.72' (Flood elevation advised)

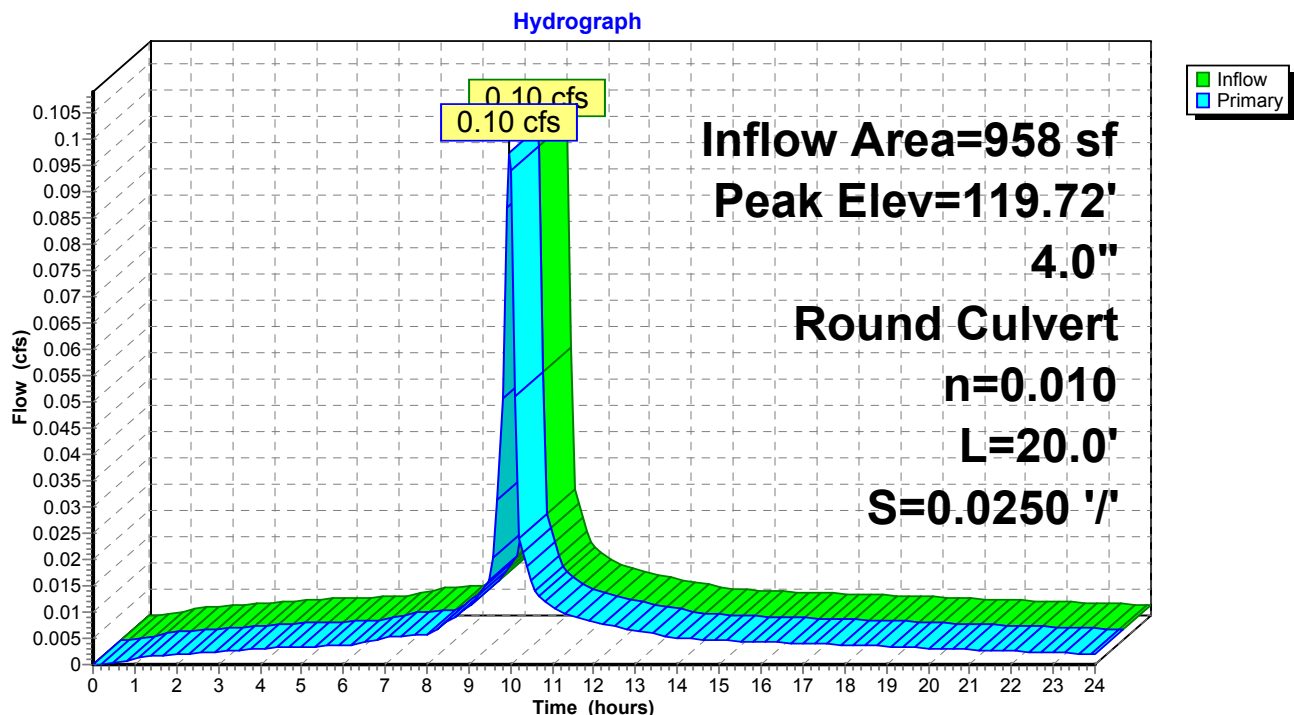
Inflow Area = 958 sf, 100.00% Impervious, Inflow Depth > 6.47" for 25-year Rainfall = 6.71" event
 Inflow = 0.10 cfs @ 9.96 hrs, Volume= 516 cf
 Outflow = 0.10 cfs @ 9.96 hrs, Volume= 516 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.10 cfs @ 9.96 hrs, Volume= 516 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 119.72' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	119.50'	4.0" Round Culvert L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.50' / 119.00' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.09 cfs @ 9.96 hrs HW=119.71' (Free Discharge)
 1=Culvert (Inlet Controls 0.09 cfs @ 1.57 fps)

Pond 8P: Trench Drain CB-8



Summary for Pond 13P: Catch Basin

[57] Hint: Peaked at 119.26' (Flood elevation advised)

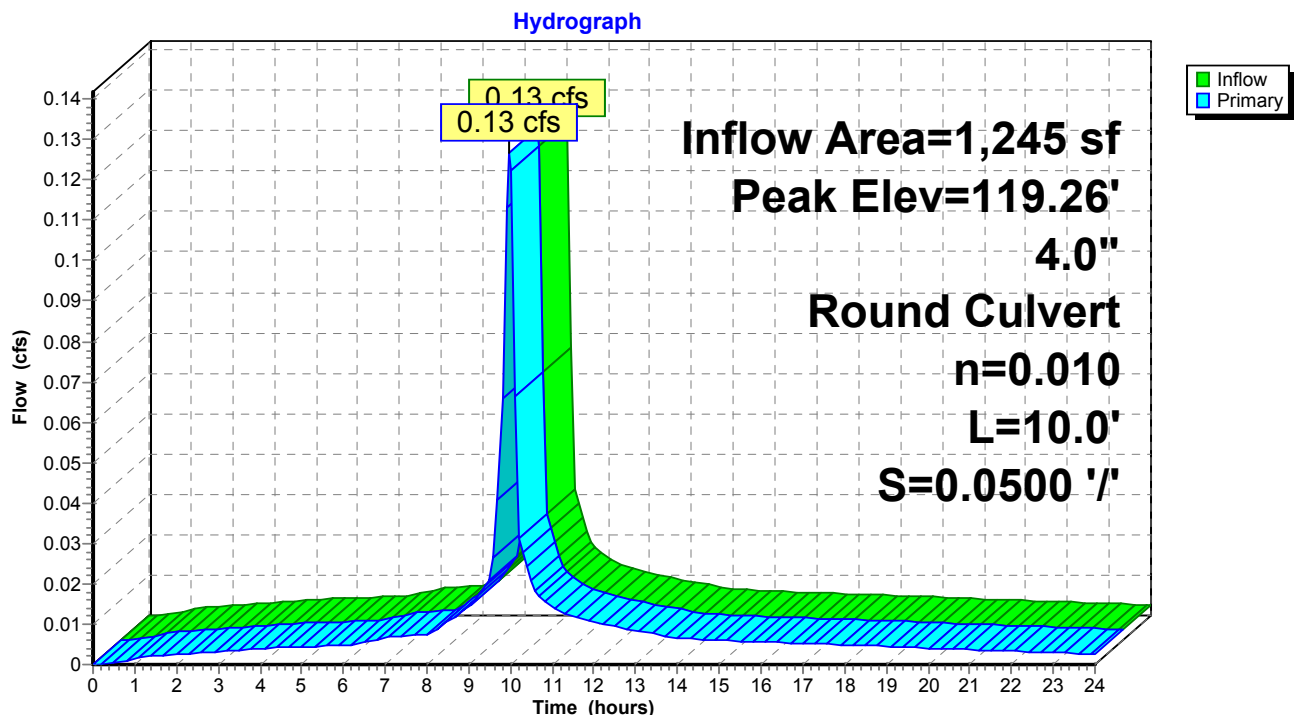
Inflow Area = 1,245 sf, 100.00% Impervious, Inflow Depth > 6.47" for 25-year Rainfall = 6.71" event
 Inflow = 0.13 cfs @ 9.96 hrs, Volume= 671 cf
 Outflow = 0.13 cfs @ 9.96 hrs, Volume= 671 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.13 cfs @ 9.96 hrs, Volume= 671 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 119.26' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	119.00'	4.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 119.00' / 118.50' S= 0.0500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.12 cfs @ 9.96 hrs HW=119.25' (Free Discharge)
 1=Culvert (Inlet Controls 0.12 cfs @ 1.70 fps)

Pond 13P: Catch Basin



Summary for Pond WST-1: Water Storage Tank -1

Inflow Area = 1,615 sf, 82.97% Impervious, Inflow Depth > 5.91" for 25-year Rainfall = 6.71" event
 Inflow = 0.15 cfs @ 9.97 hrs, Volume= 795 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 125.56' @ 24.00 hrs Surf.Area= 128 sf Storage= 794 cf

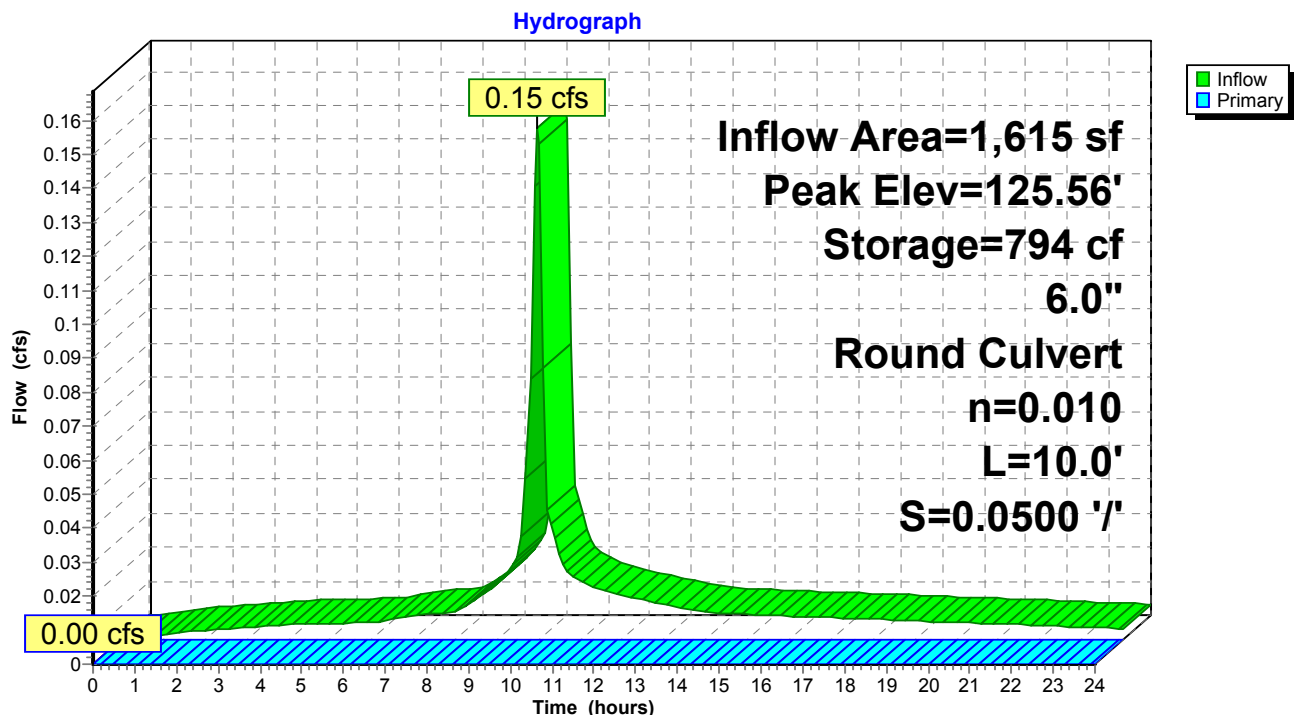
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	1,018 cf	108.0" Round Pipe Storage L= 16.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	127.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 127.50' / 127.00' S= 0.0500 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=119.00' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-1: Water Storage Tank -1



Summary for Pond WST-2: Water Storage Tank - 2

Inflow Area = 3,740 sf, 76.36% Impervious, Inflow Depth > 5.69" for 25-year Rainfall = 6.71" event
 Inflow = 0.34 cfs @ 9.97 hrs, Volume= 1,773 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 117.88' @ 24.00 hrs Surf.Area= 178 sf Storage= 1,772 cf

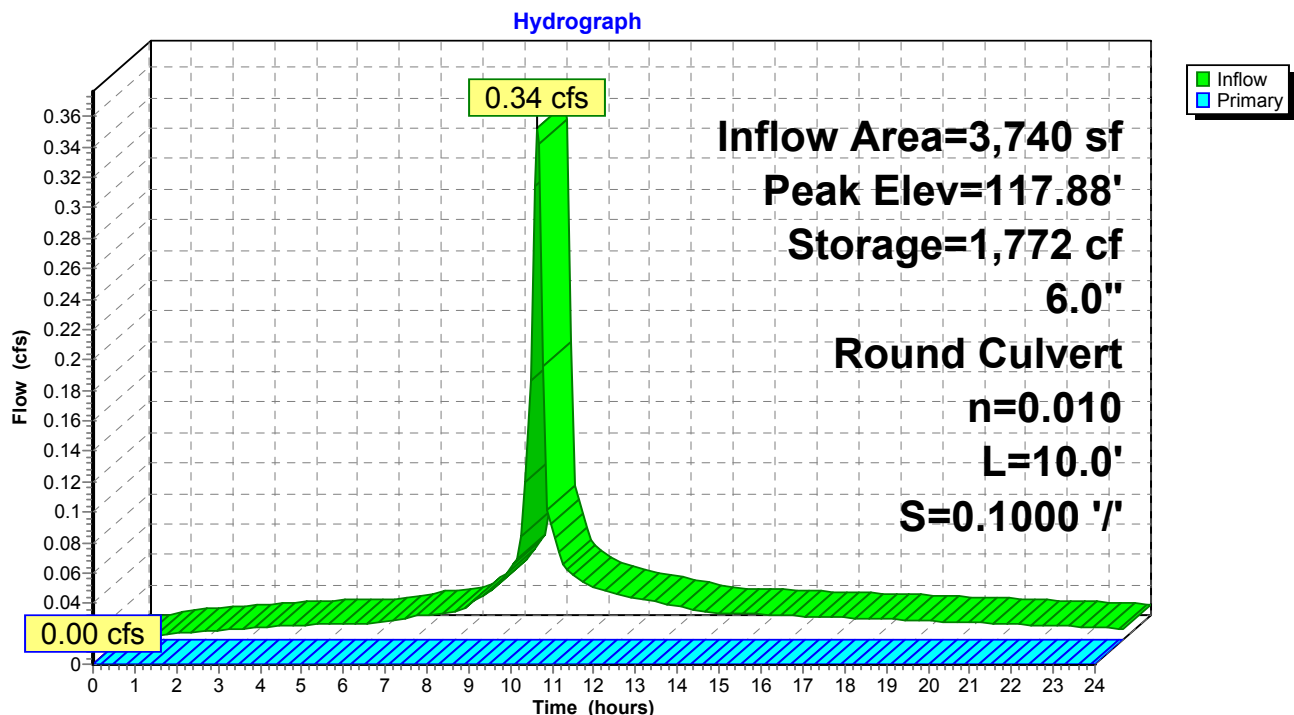
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

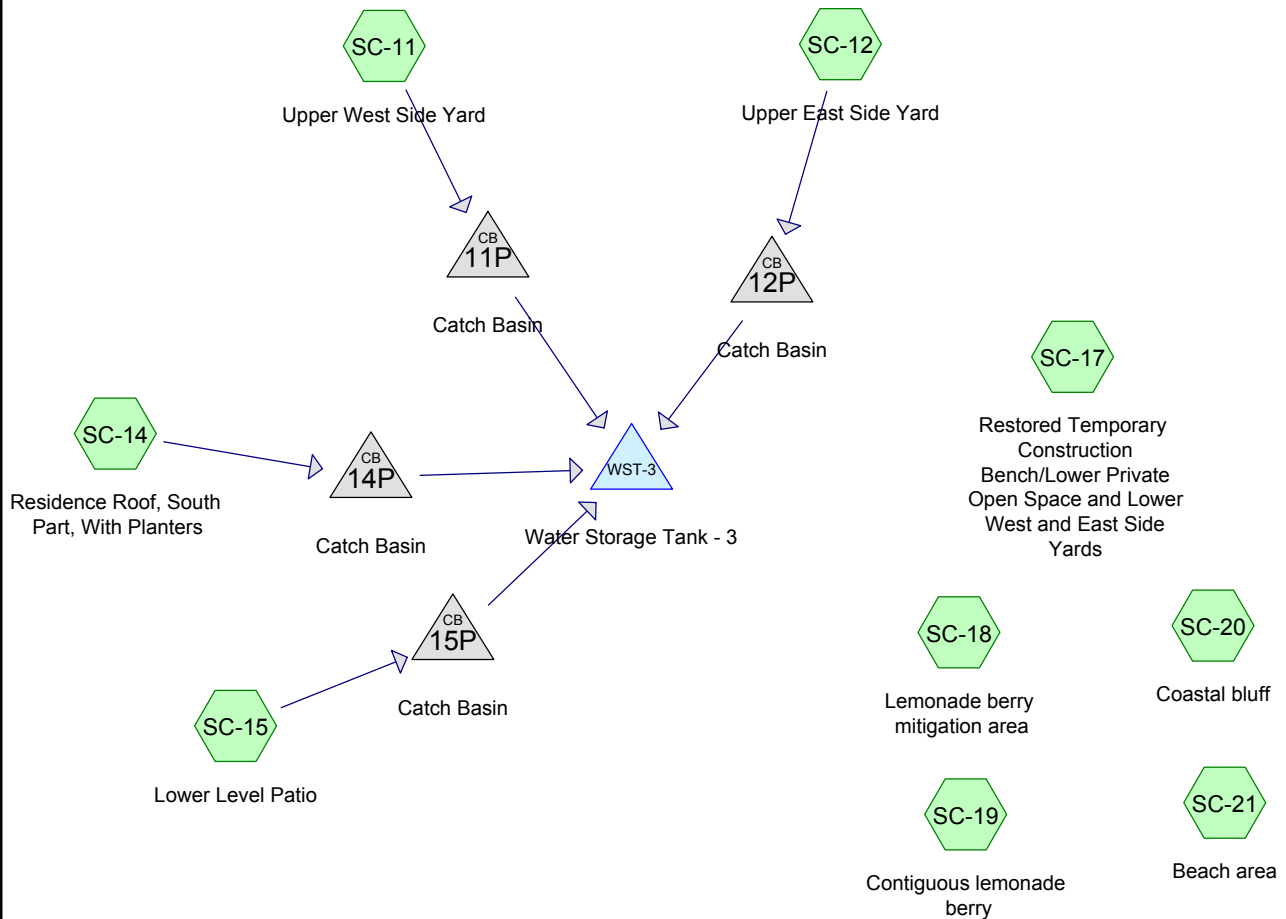
Volume	Invert	Avail.Storage	Storage Description
#1	110.00'	1,909 cf	108.0" Round Pipe Storage L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	118.50'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 118.50' / 117.50' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=110.00' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-2: Water Storage Tank - 2





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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
1,779	68	<50% Grass cover, Poor, HSG A (SC-11, SC-12, SC-17)
6,892	35	Brush, Fair, HSG A (SC-18, SC-19)
1,658	48	Brush, Poor, HSG A (SC-20)
1,694	83	Brush, Poor, HSG D (SC-21)
945	98	Roofs, HSG A (SC-14)
1,085	98	Unconnected pavement, HSG A (SC-11, SC-12, SC-15, SC-17, SC-18)
416	98	Unconnected pavement, HSG D (SC-21)
14,469	57	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
12,359	HSG A	SC-11, SC-12, SC-14, SC-15, SC-17, SC-18, SC-19, SC-20
0	HSG B	
0	HSG C	
2,110	HSG D	SC-21
0	Other	
14,469		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subo Num
1,779	0	0	0	0	1,779	<50% Grass cover, Poor	
6,892	0	0	0	0	6,892	Brush, Fair	
1,658	0	0	1,694	0	3,352	Brush, Poor	
945	0	0	0	0	945	Roofs	
1,085	0	0	416	0	1,501	Unconnected pavement	
12,359	0	0	2,110	0	14,469	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	11P	95.50	95.00	31.0	0.0161	0.010	4.0	0.0	0.0
2	12P	95.50	95.00	35.0	0.0143	0.010	4.0	0.0	0.0
3	14P	96.00	95.00	5.0	0.2000	0.010	4.0	0.0	0.0
4	15P	95.50	95.00	5.0	0.1000	0.010	4.0	0.0	0.0
5	WST-3	95.00	95.00	10.0	0.0000	0.010	6.0	0.0	0.0

1925 ECDLL_Post Construction Analysis_2015-06-03_LowType I 24-hr 1" Rainfall=1.00"

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: Upper West Side Yard Runoff Area=465 sf 50.11% Impervious Runoff Depth>0.40"
Flow Length=78' Slope=0.4300 '/ Tc=3.0 min CN=68/98 Runoff=0.00 cfs 15 cf

Subcatchment SC-12: Upper East Side Yard Runoff Area=363 sf 49.86% Impervious Runoff Depth>0.39"
Flow Length=65' Slope=0.3600 '/ Tc=3.0 min CN=68/98 Runoff=0.00 cfs 12 cf

Subcatchment SC-14: Residence Roof, Runoff Area=945 sf 100.00% Impervious Runoff Depth>0.79"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.01 cfs 62 cf

Subcatchment SC-15: Lower Level Patio Runoff Area=461 sf 100.00% Impervious Runoff Depth>0.79"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.01 cfs 30 cf

Subcatchment SC-17: Restored Temporary Runoff Area=1,516 sf 9.96% Impervious Runoff Depth>0.08"
Flow Length=50' Slope=0.2400 '/ Tc=3.0 min CN=68/98 Runoff=0.00 cfs 10 cf

Subcatchment SC-18: Lemonade berry Runoff Area=590 sf 10.00% Impervious Runoff Depth>0.08"
Flow Length=25' Slope=0.2400 '/ Tc=3.0 min CN=35/98 Runoff=0.00 cfs 4 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=130' Slope=0.2300 '/ Tc=3.0 min CN=35/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=35' Slope=1.0000 '/ Tc=3.0 min CN=48/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>0.26"
Flow Length=35' Slope=0.2100 '/ Tc=3.0 min CN=83/98 Runoff=0.01 cfs 46 cf

Pond 11P: Catch Basin Peak Elev=95.54' Inflow=0.00 cfs 15 cf
4.0" Round Culvert n=0.010 L=31.0' S=0.0161 '/ Outflow=0.00 cfs 15 cf

Pond 12P: Catch Basin Peak Elev=95.53' Inflow=0.00 cfs 12 cf
4.0" Round Culvert n=0.010 L=35.0' S=0.0143 '/ Outflow=0.00 cfs 12 cf

Pond 14P: Catch Basin Peak Elev=96.07' Inflow=0.01 cfs 62 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.2000 '/ Outflow=0.01 cfs 62 cf

Pond 15P: Catch Basin Peak Elev=95.55' Inflow=0.01 cfs 30 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/ Outflow=0.01 cfs 30 cf

Pond WST-3: Water Storage Tank - 3 Peak Elev=90.85' Storage=986 cf Inflow=0.03 cfs 987 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/ Outflow=0.00 cfs 0 cf

Total Runoff Area = 14,469 sf Runoff Volume = 180 cf Average Runoff Depth = 0.15"
83.09% Pervious = 12,023 sf 16.91% Impervious = 2,446 sf

Summary for Subcatchment SC-11: Upper West Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

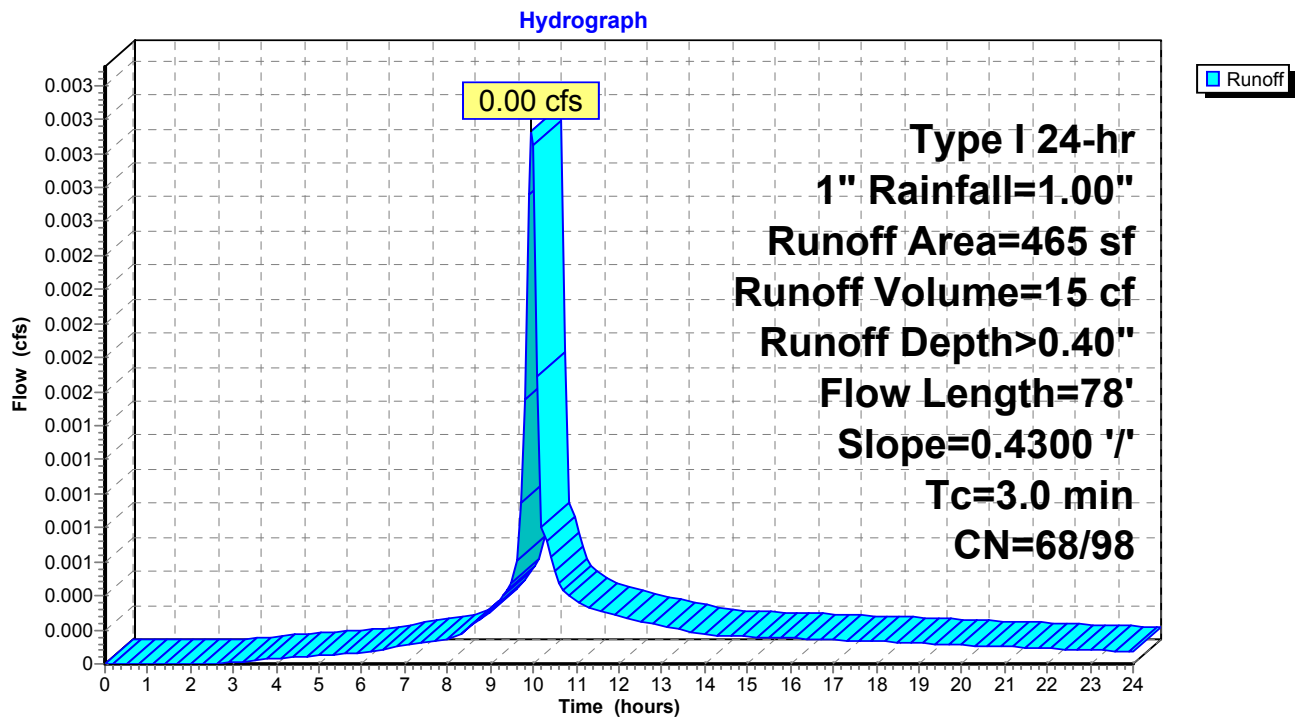
Runoff = 0.00 cfs @ 9.97 hrs, Volume= 15 cf, Depth> 0.40"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
232	68	<50% Grass cover, Poor, HSG A
233	98	Unconnected pavement, HSG A
465	83	Weighted Average
232	68	49.89% Pervious Area
233	98	50.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-11: Upper West Side Yard



Summary for Subcatchment SC-12: Upper East Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

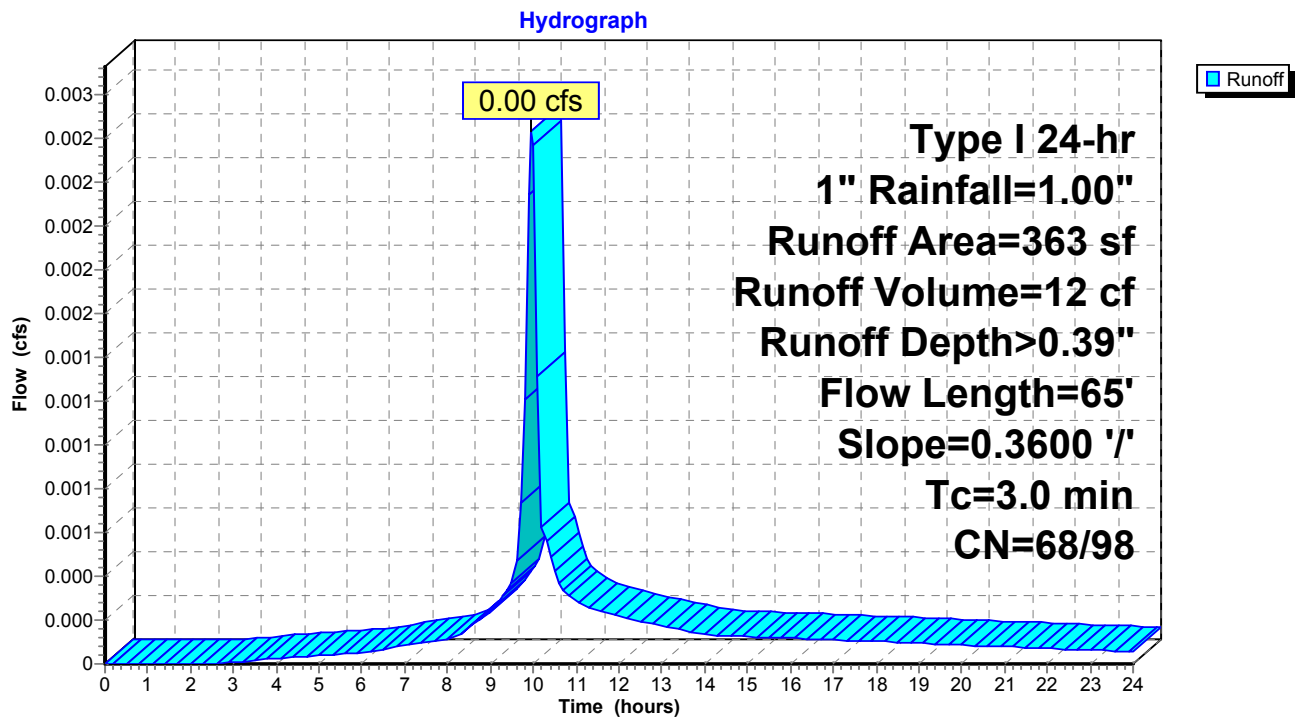
Runoff = 0.00 cfs @ 9.97 hrs, Volume= 12 cf, Depth> 0.39"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
182	68	<50% Grass cover, Poor, HSG A
181	98	Unconnected pavement, HSG A
363	83	Weighted Average
182	68	50.14% Pervious Area
181	98	49.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	65	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-12: Upper East Side Yard



Summary for Subcatchment SC-14: Residence Roof, South Part, With Planters

[49] Hint: $T_c < 2dt$ may require smaller dt

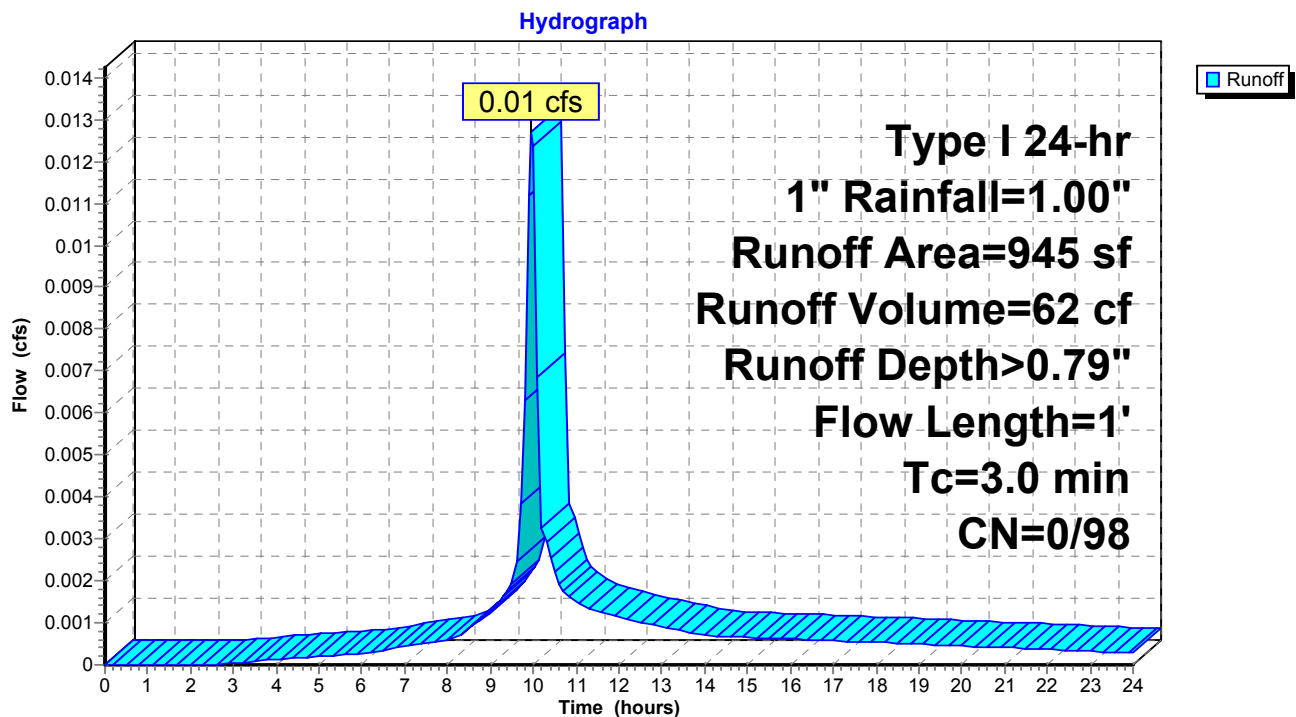
Runoff = 0.01 cfs @ 9.97 hrs, Volume= 62 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
945	98	Roofs, HSG A
945	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1				Total, Increased to minimum Tc = 3.0 min

Subcatchment SC-14: Residence Roof, South Part, With Planters



Summary for Subcatchment SC-15: Lower Level Patio

[49] Hint: $T_c < 2dt$ may require smaller dt

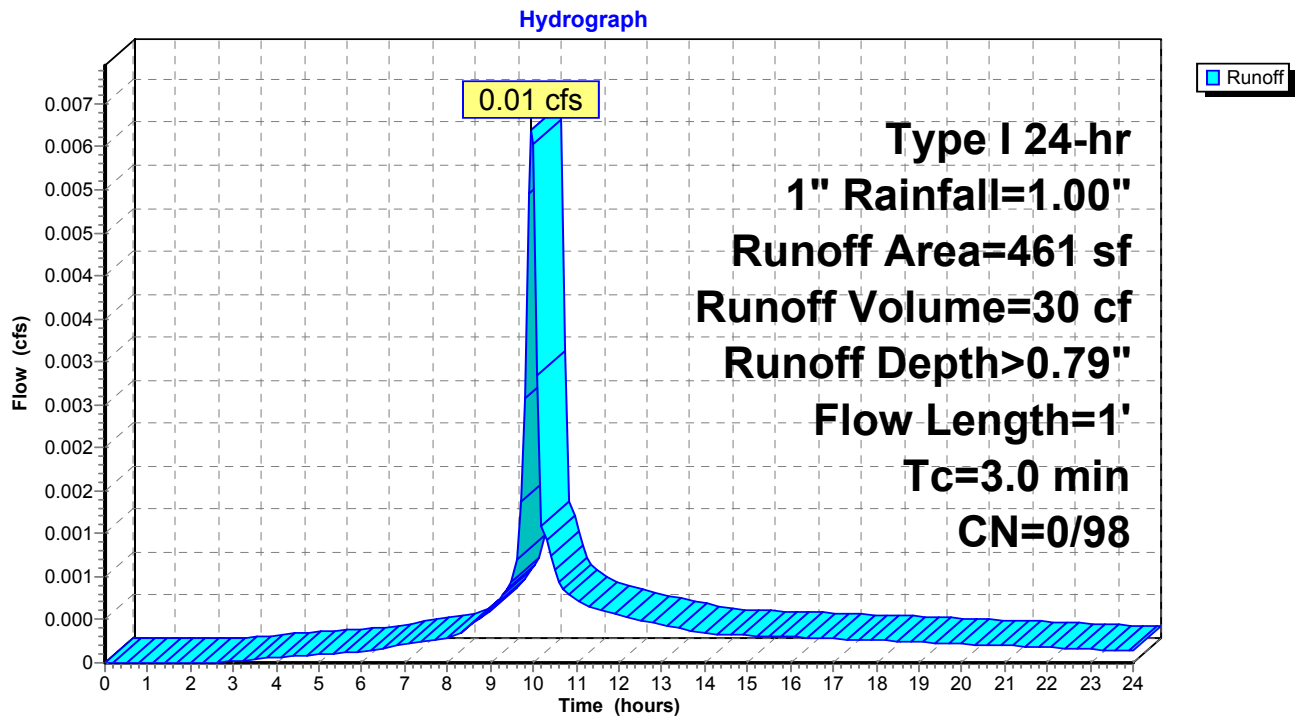
Runoff = 0.01 cfs @ 9.97 hrs, Volume= 30 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
461	98	Unconnected pavement, HSG A
461	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-15: Lower Level Patio



Catchment SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West

[49] Hint: $T_c < 2dt$ may require smaller dt

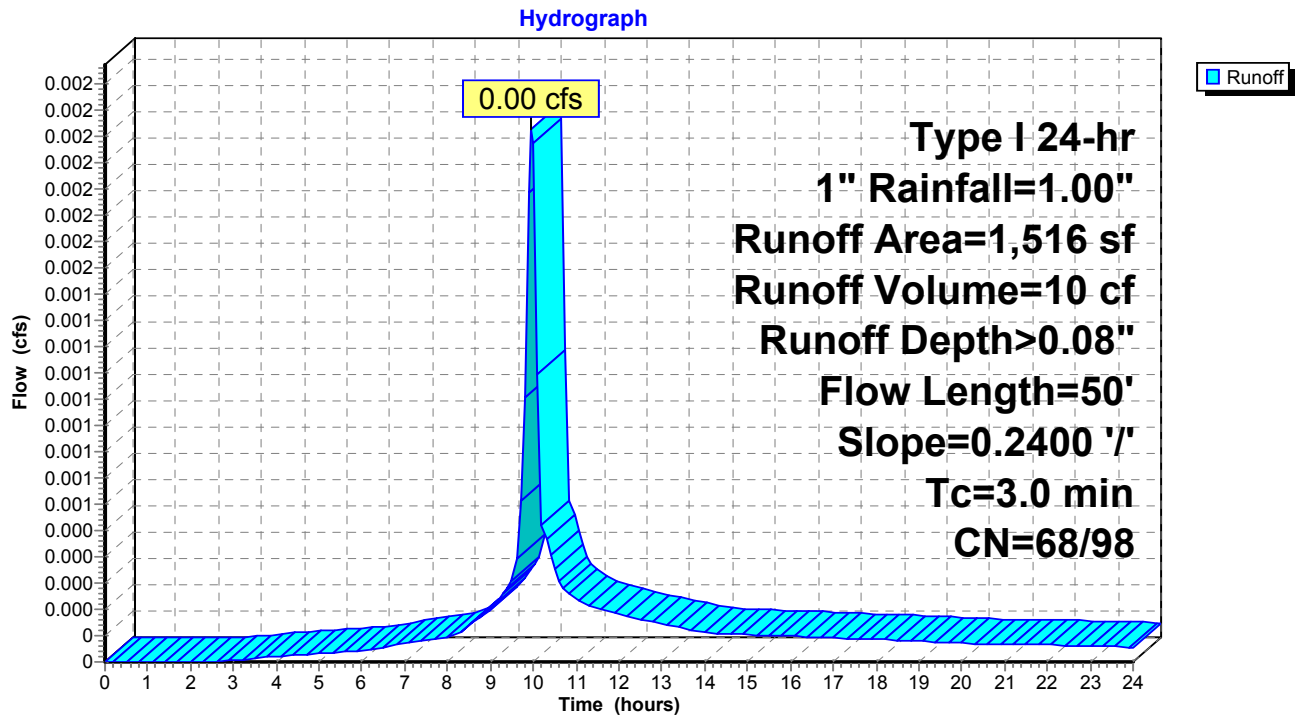
Runoff = 0.00 cfs @ 9.97 hrs, Volume= 10 cf, Depth> 0.08"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
1,365	68	<50% Grass cover, Poor, HSG A
151	98	Unconnected pavement, HSG A
1,516	71	Weighted Average
1,365	68	90.04% Pervious Area
151	98	9.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum $T_c = 3.0$ min			

ent SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West and E



Summary for Subcatchment SC-18: Lemonade berry mitigation area

[49] Hint: $T_c < 2dt$ may require smaller dt

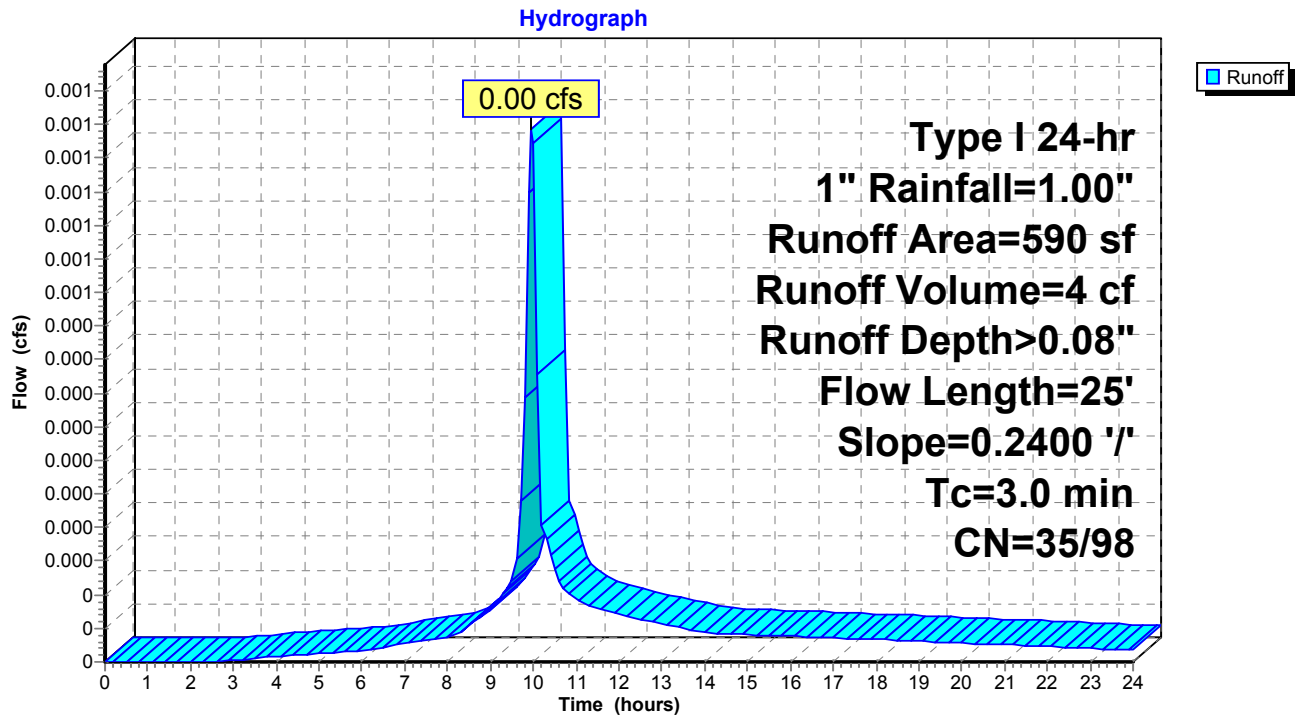
Runoff = 0.00 cfs @ 9.97 hrs, Volume= 4 cf, Depth> 0.08"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
531	35	Brush, Fair, HSG A
59	98	Unconnected pavement, HSG A
590	41	Weighted Average
531	35	90.00% Pervious Area
59	98	10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-18: Lemonade berry mitigation area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

[45] Hint: Runoff=Zero

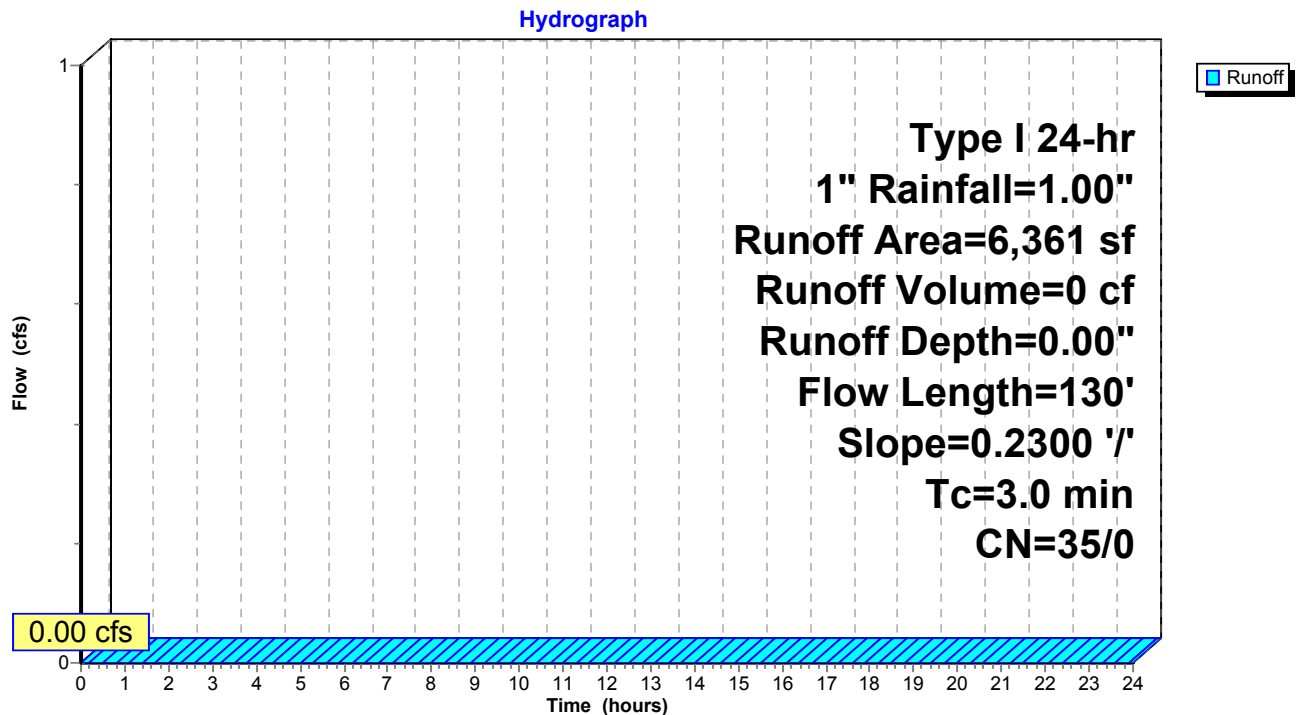
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

[45] Hint: Runoff=Zero

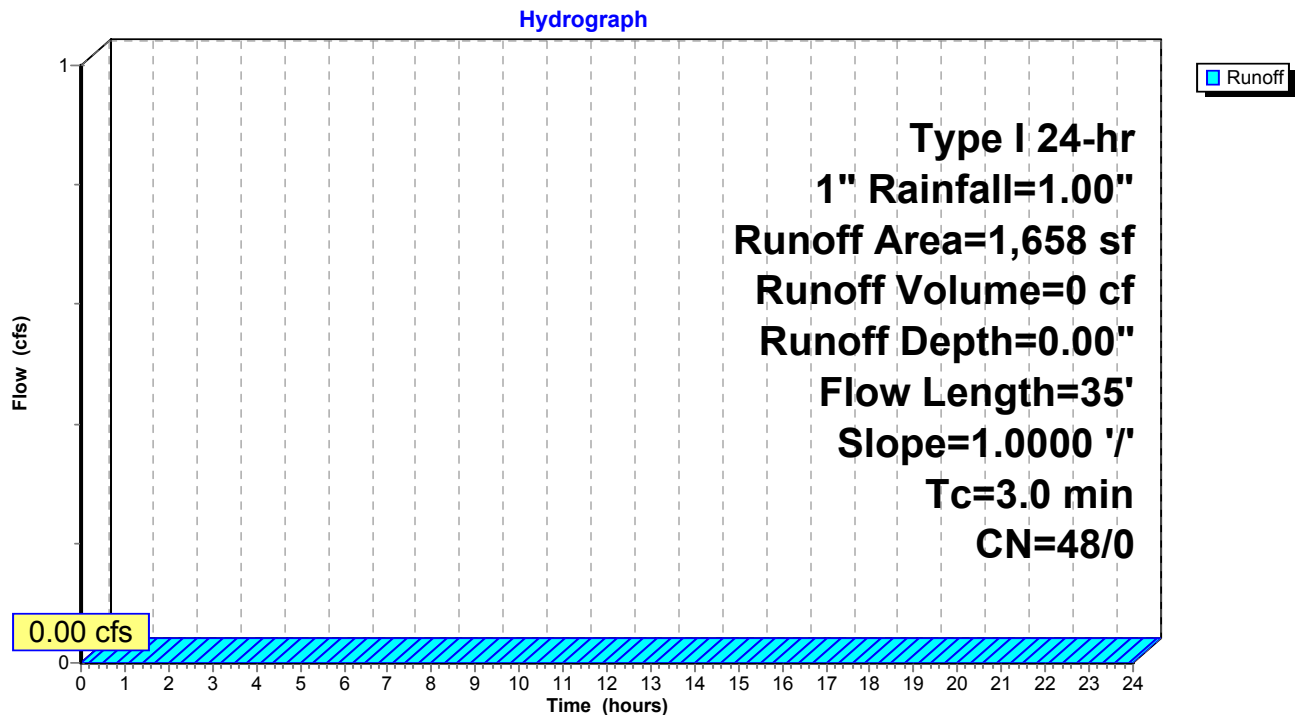
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

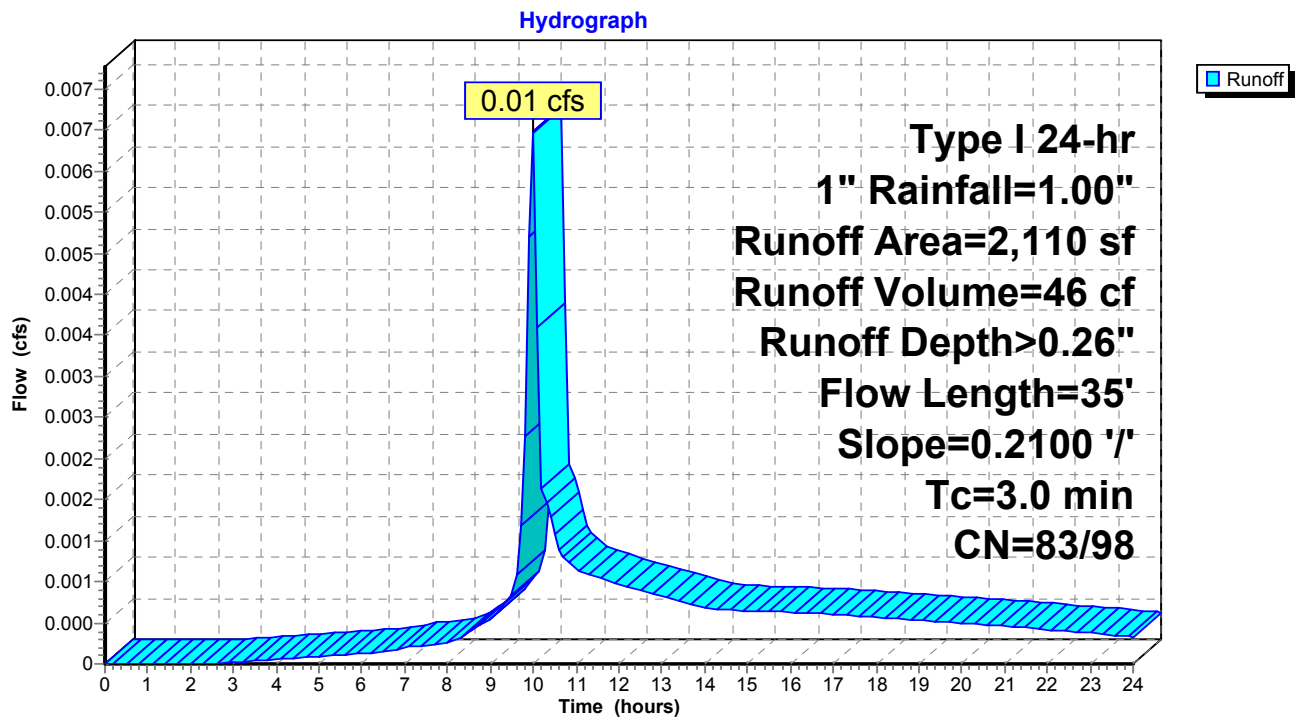
Runoff = 0.01 cfs @ 9.98 hrs, Volume= 46 cf, Depth> 0.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.7	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-21: Beach area



Summary for Pond 11P: Catch Basin

[57] Hint: Peaked at 95.54' (Flood elevation advised)

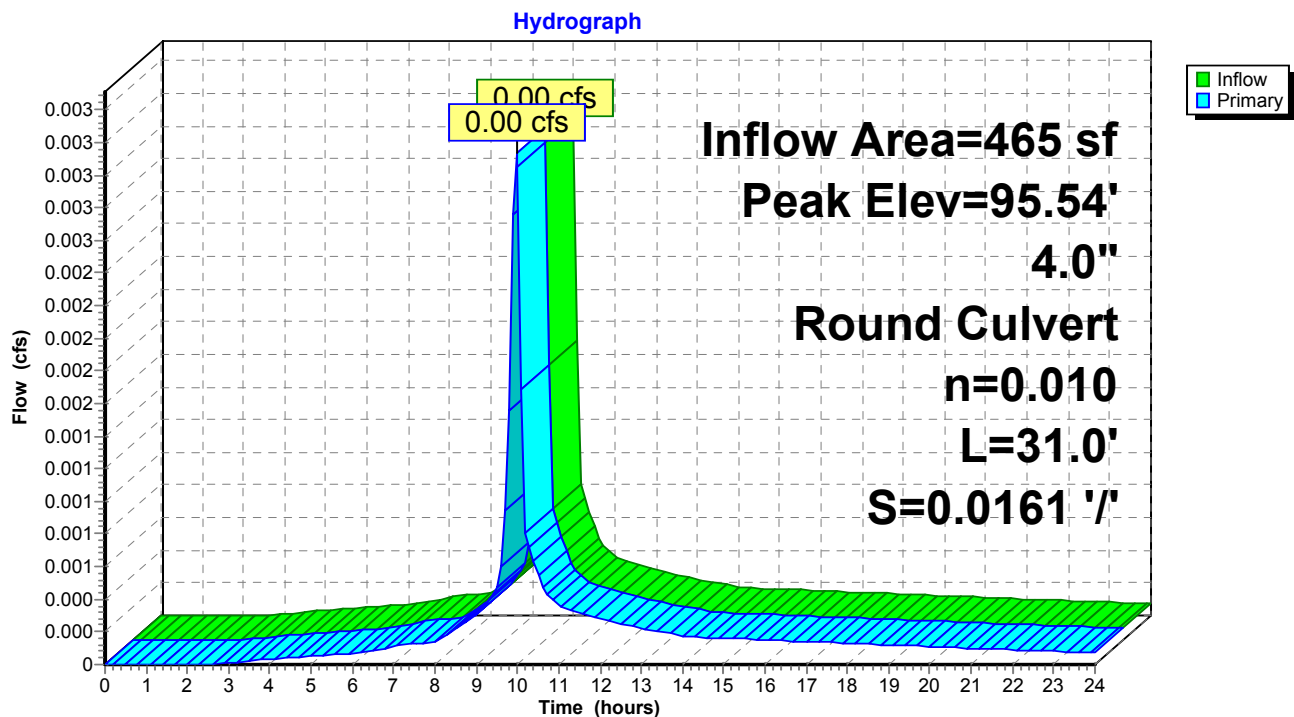
Inflow Area = 465 sf, 50.11% Impervious, Inflow Depth > 0.40" for 1" event
 Inflow = 0.00 cfs @ 9.97 hrs, Volume= 15 cf
 Outflow = 0.00 cfs @ 9.97 hrs, Volume= 15 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.00 cfs @ 9.97 hrs, Volume= 15 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.54' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0161 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.00 cfs @ 9.97 hrs HW=95.53' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.00 cfs @ 0.63 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Catch Basin

[57] Hint: Peaked at 95.53' (Flood elevation advised)

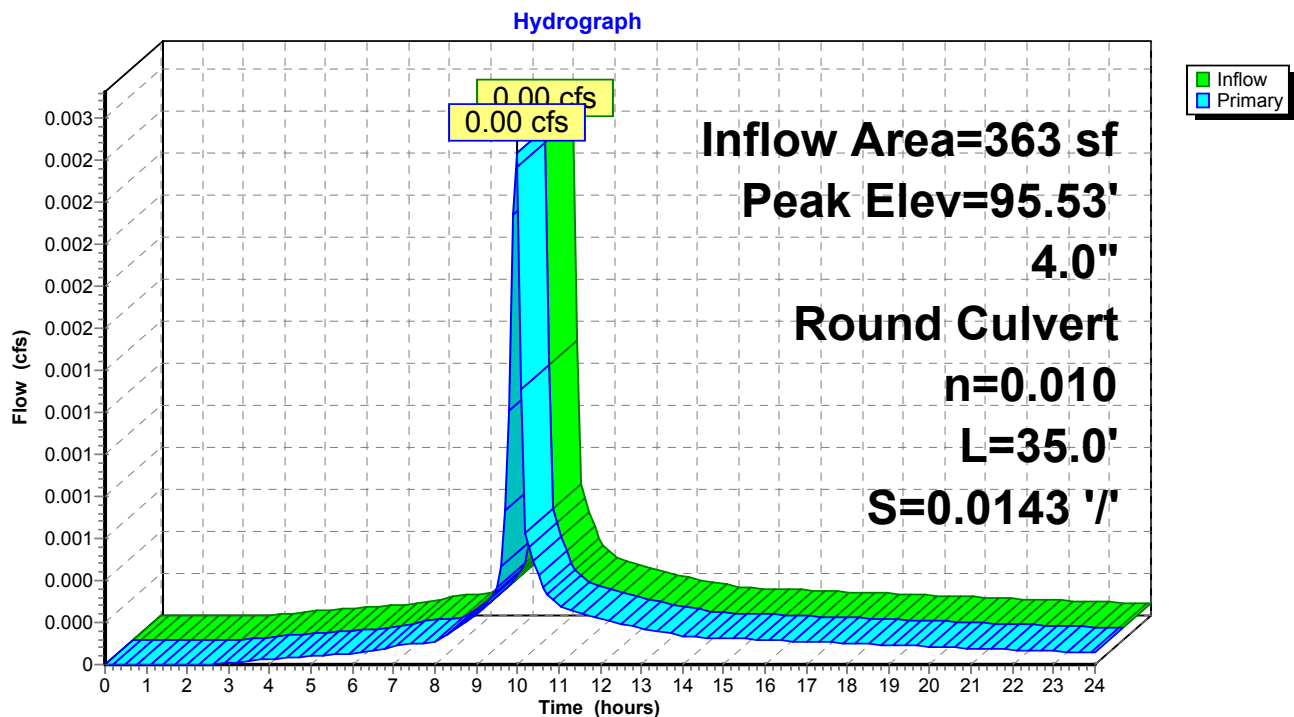
Inflow Area = 363 sf, 49.86% Impervious, Inflow Depth > 0.39" for 1" event
 Inflow = 0.00 cfs @ 9.97 hrs, Volume= 12 cf
 Outflow = 0.00 cfs @ 9.97 hrs, Volume= 12 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.00 cfs @ 9.97 hrs, Volume= 12 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.53' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0143 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.00 cfs @ 9.97 hrs HW=95.53' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.00 cfs @ 0.59 fps)

Pond 12P: Catch Basin



Summary for Pond 14P: Catch Basin

[57] Hint: Peaked at 96.07' (Flood elevation advised)

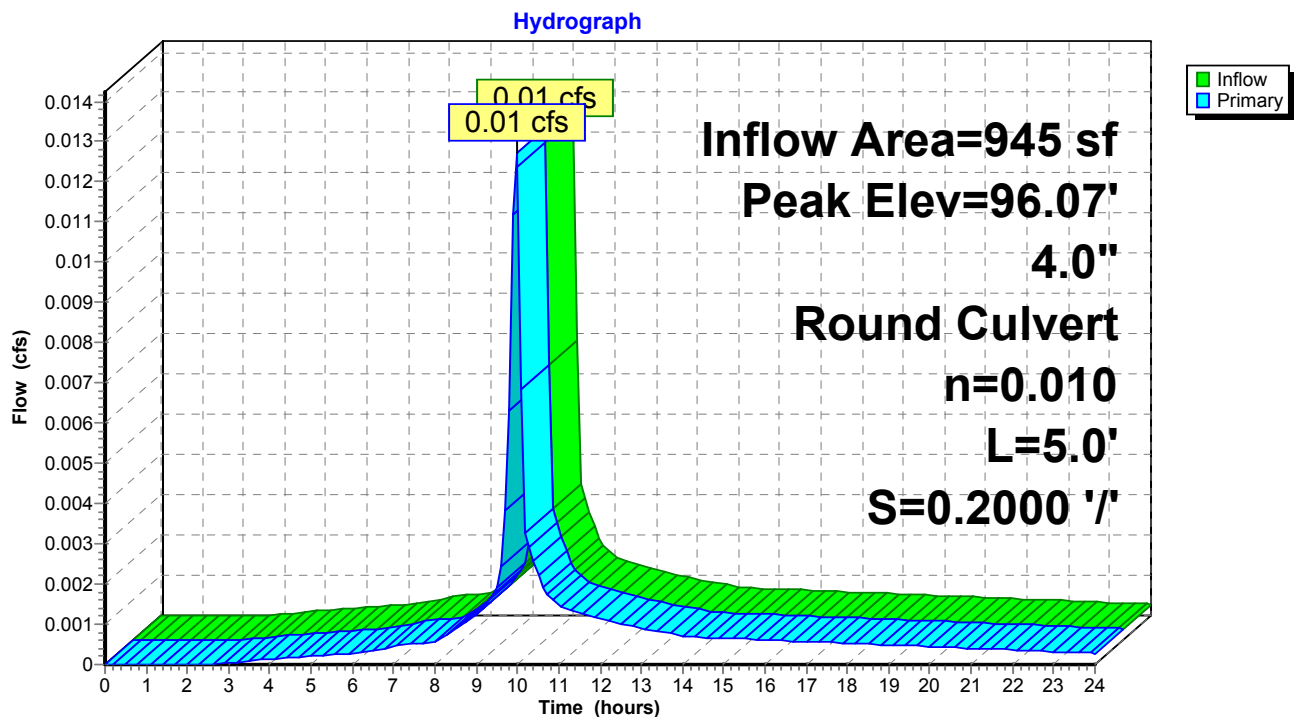
Inflow Area = 945 sf, 100.00% Impervious, Inflow Depth > 0.79" for 1" event
 Inflow = 0.01 cfs @ 9.97 hrs, Volume= 62 cf
 Outflow = 0.01 cfs @ 9.97 hrs, Volume= 62 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 9.97 hrs, Volume= 62 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 96.07' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	96.00'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.00' / 95.00' S= 0.2000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 9.97 hrs HW=96.07' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.01 cfs @ 0.90 fps)

Pond 14P: Catch Basin



Summary for Pond 15P: Catch Basin

[57] Hint: Peaked at 95.55' (Flood elevation advised)

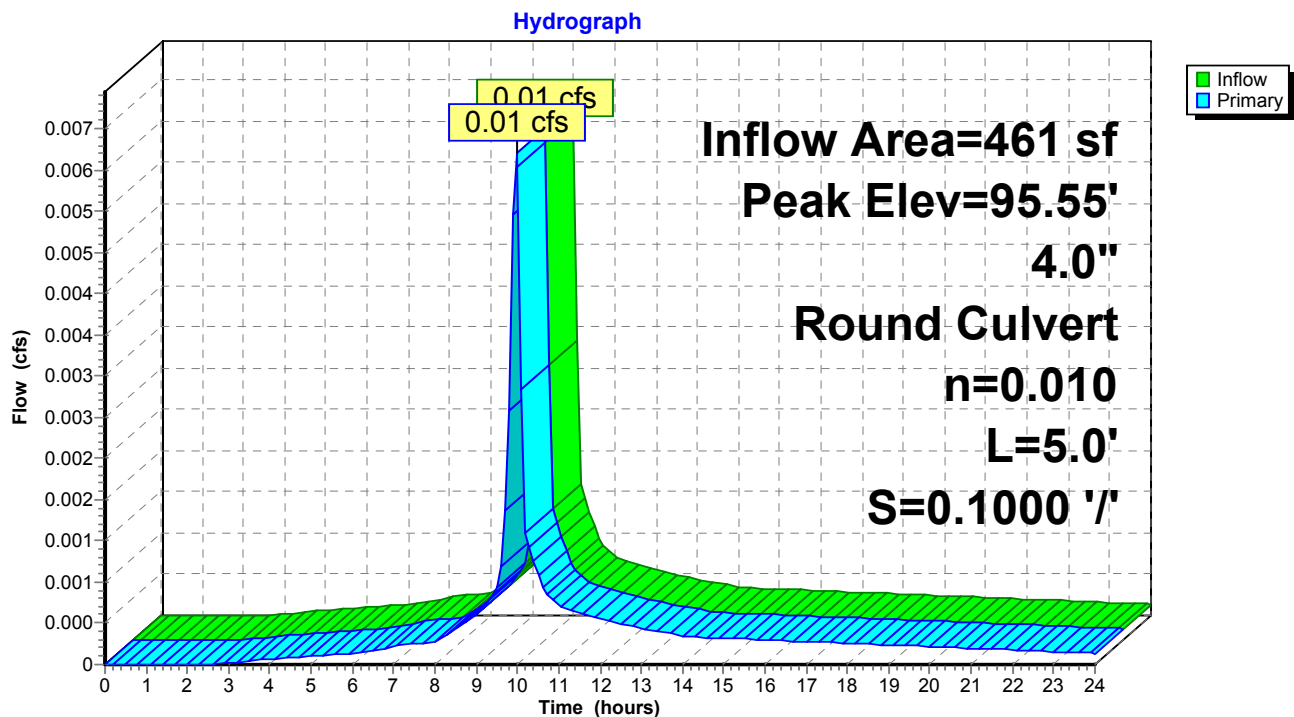
Inflow Area = 461 sf, 100.00% Impervious, Inflow Depth > 0.79" for 1" event
 Inflow = 0.01 cfs @ 9.97 hrs, Volume= 30 cf
 Outflow = 0.01 cfs @ 9.97 hrs, Volume= 30 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 9.97 hrs, Volume= 30 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.55' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 9.97 hrs HW=95.55' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.01 cfs @ 0.75 fps)

Pond 15P: Catch Basin



Summary for Pond WST-3: Water Storage Tank - 3

Inflow Area = 2,234 sf, 81.47% Impervious, Inflow Depth > 5.30" for 1" event
 Inflow = 0.03 cfs @ 9.97 hrs, Volume= 987 cf, Incl. 0.01 cfs Base Flow
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 90.85' @ 24.00 hrs Surf.Area= 256 sf Storage= 986 cf

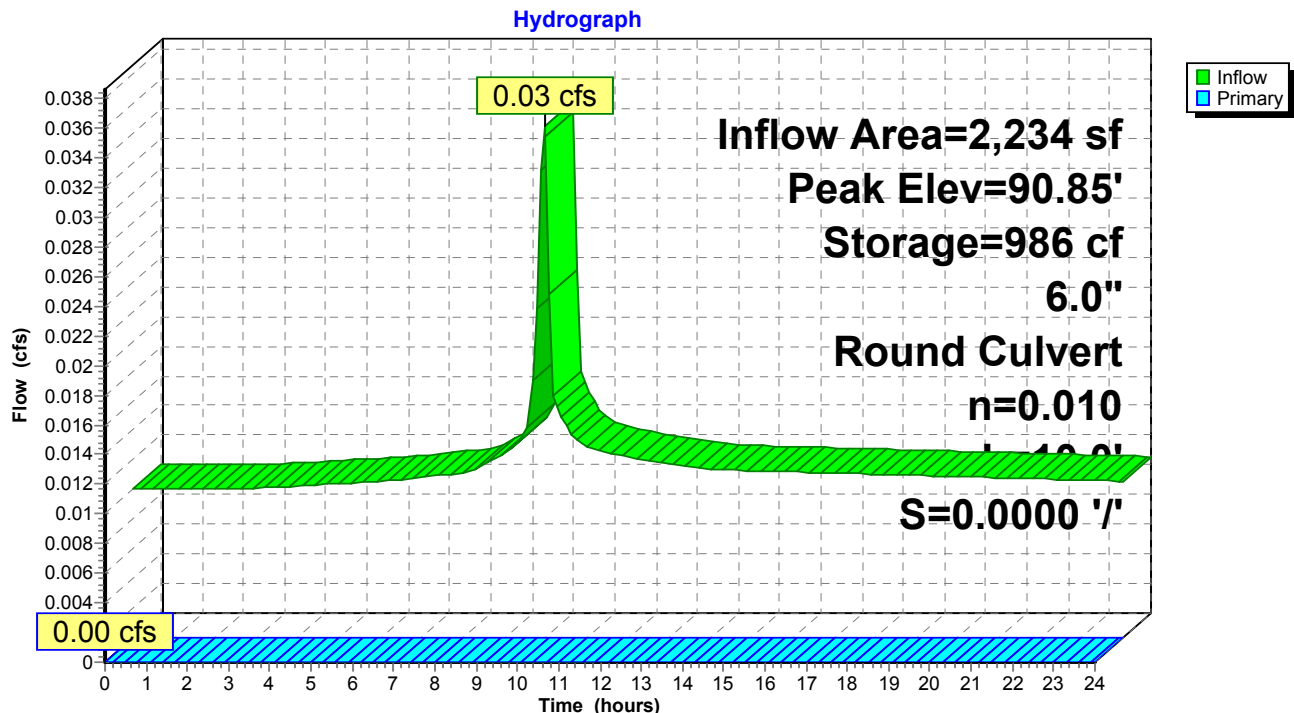
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	87.00'	2,048 cf	96.0" W x 96.0" H Box Pipe Storage L= 32.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	95.00'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.00' / 95.00' S= 0.0000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=87.01' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-3: Water Storage Tank - 3



1925 ECDLL_Post Construction Analysis Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Prepared by {enter your company name here}

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: Upper West Side Yard Runoff Area=465 sf 50.11% Impervious Runoff Depth>1.85"
Flow Length=78' Slope=0.4300 '/ Tc=3.0 min CN=68/98 Runoff=0.01 cfs 72 cf

Subcatchment SC-12: Upper East Side Yard Runoff Area=363 sf 49.86% Impervious Runoff Depth>1.85"
Flow Length=65' Slope=0.3600 '/ Tc=3.0 min CN=68/98 Runoff=0.01 cfs 56 cf

Subcatchment SC-14: Residence Roof, Runoff Area=945 sf 100.00% Impervious Runoff Depth>2.97"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.05 cfs 234 cf

Subcatchment SC-15: Lower Level Patio Runoff Area=461 sf 100.00% Impervious Runoff Depth>2.97"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.02 cfs 114 cf

Subcatchment SC-17: Restored Temporary Runoff Area=1,516 sf 9.96% Impervious Runoff Depth>0.95"
Flow Length=50' Slope=0.2400 '/ Tc=3.0 min CN=68/98 Runoff=0.02 cfs 121 cf

Subcatchment SC-18: Lemonade berry Runoff Area=590 sf 10.00% Impervious Runoff Depth>0.30"
Flow Length=25' Slope=0.2400 '/ Tc=3.0 min CN=35/98 Runoff=0.00 cfs 15 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=130' Slope=0.2300 '/ Tc=3.0 min CN=35/0 Runoff=0.00 cfs 0 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.09"
Flow Length=35' Slope=1.0000 '/ Tc=3.0 min CN=48/0 Runoff=0.00 cfs 12 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>1.88"
Flow Length=35' Slope=0.2100 '/ Tc=3.0 min CN=83/98 Runoff=0.06 cfs 330 cf

Pond 11P: Catch Basin Peak Elev=95.57' Inflow=0.01 cfs 72 cf
4.0" Round Culvert n=0.010 L=31.0' S=0.0161 '/' Outflow=0.01 cfs 72 cf

Pond 12P: Catch Basin Peak Elev=95.56' Inflow=0.01 cfs 56 cf
4.0" Round Culvert n=0.010 L=35.0' S=0.0143 '/' Outflow=0.01 cfs 56 cf

Pond 14P: Catch Basin Peak Elev=96.14' Inflow=0.05 cfs 234 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.2000 '/' Outflow=0.05 cfs 234 cf

Pond 15P: Catch Basin Peak Elev=95.60' Inflow=0.02 cfs 114 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/' Outflow=0.02 cfs 114 cf

Pond WST-3: Water Storage Tank - 3 Peak Elev=92.24' Storage=1,340 cf Inflow=0.10 cfs 1,343 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.00 cfs 0 cf

Total Runoff Area = 14,469 sf Runoff Volume = 952 cf Average Runoff Depth = 0.79"
83.09% Pervious = 12,023 sf 16.91% Impervious = 2,446 sf

Summary for Subcatchment SC-11: Upper West Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

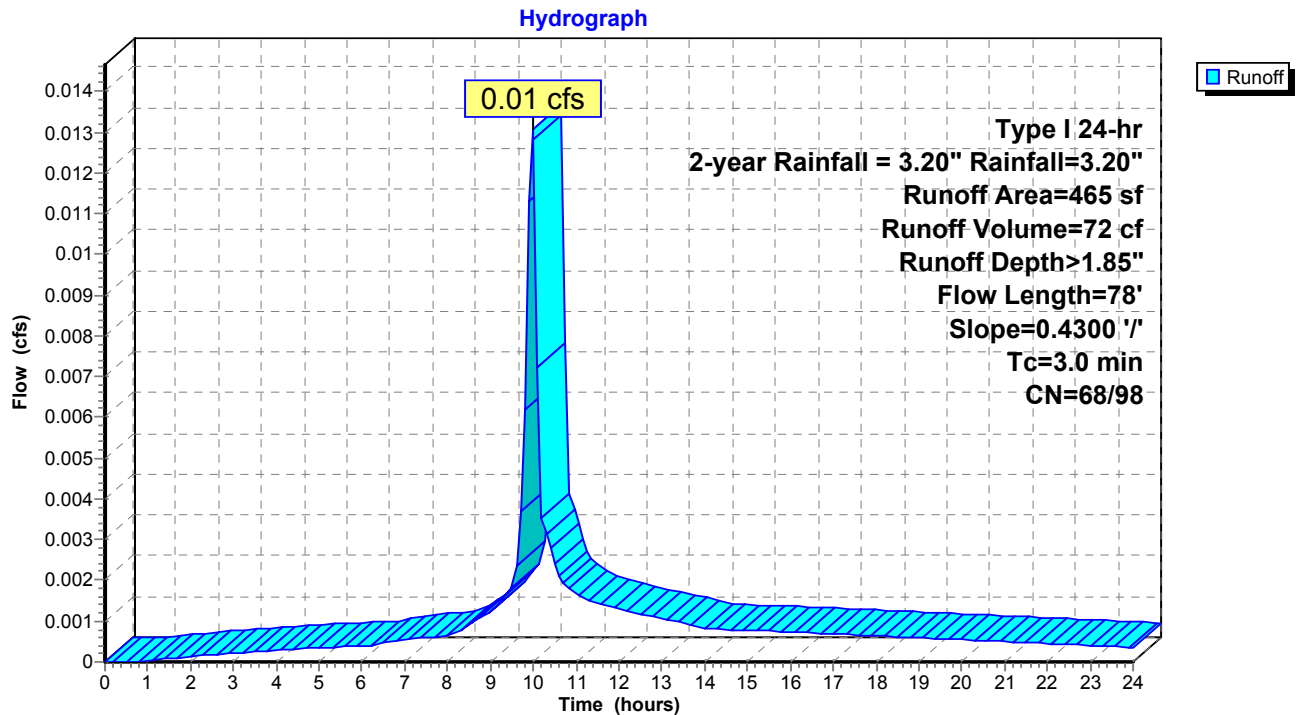
Runoff = 0.01 cfs @ 9.97 hrs, Volume= 72 cf, Depth> 1.85"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
232	68	<50% Grass cover, Poor, HSG A
233	98	Unconnected pavement, HSG A
465	83	Weighted Average
232	68	49.89% Pervious Area
233	98	50.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-11: Upper West Side Yard



Summary for Subcatchment SC-12: Upper East Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

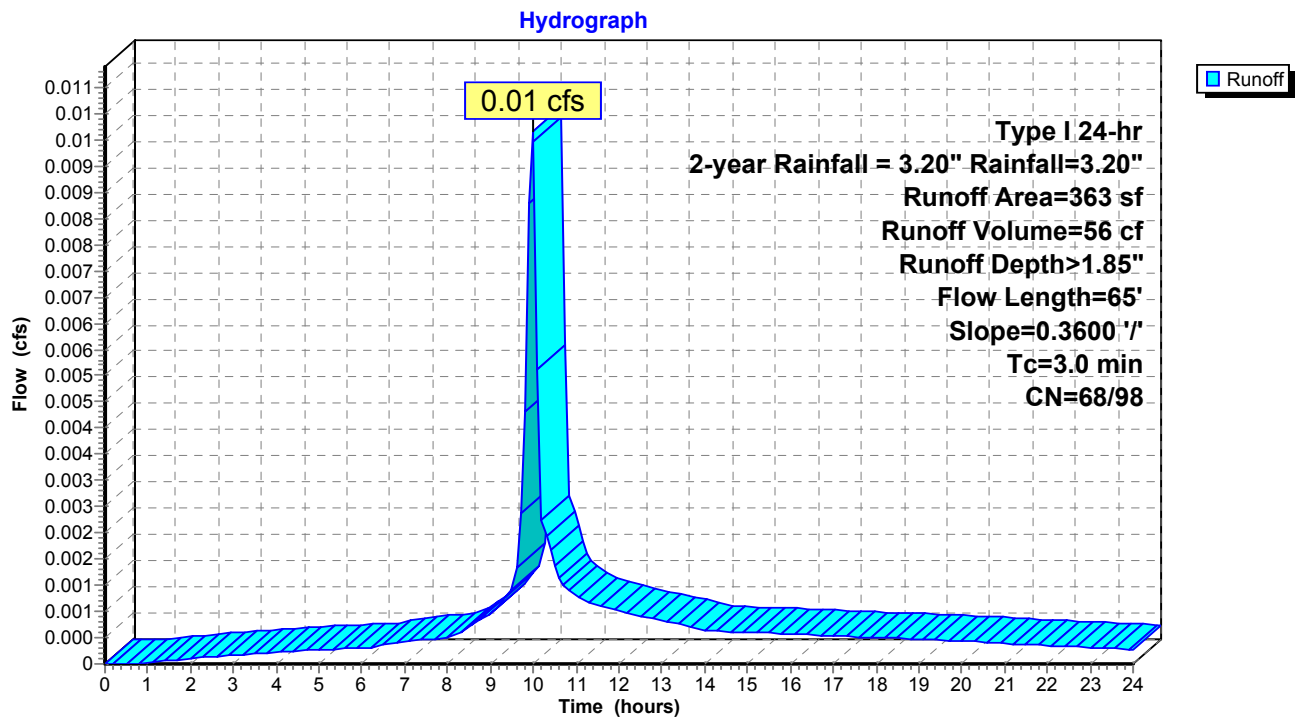
Runoff = 0.01 cfs @ 9.97 hrs, Volume= 56 cf, Depth> 1.85"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
182	68	<50% Grass cover, Poor, HSG A
181	98	Unconnected pavement, HSG A
363	83	Weighted Average
182	68	50.14% Pervious Area
181	98	49.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.9	65	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-12: Upper East Side Yard



Summary for Subcatchment SC-14: Residence Roof, South Part, With Planters

[49] Hint: $T_c < 2dt$ may require smaller dt

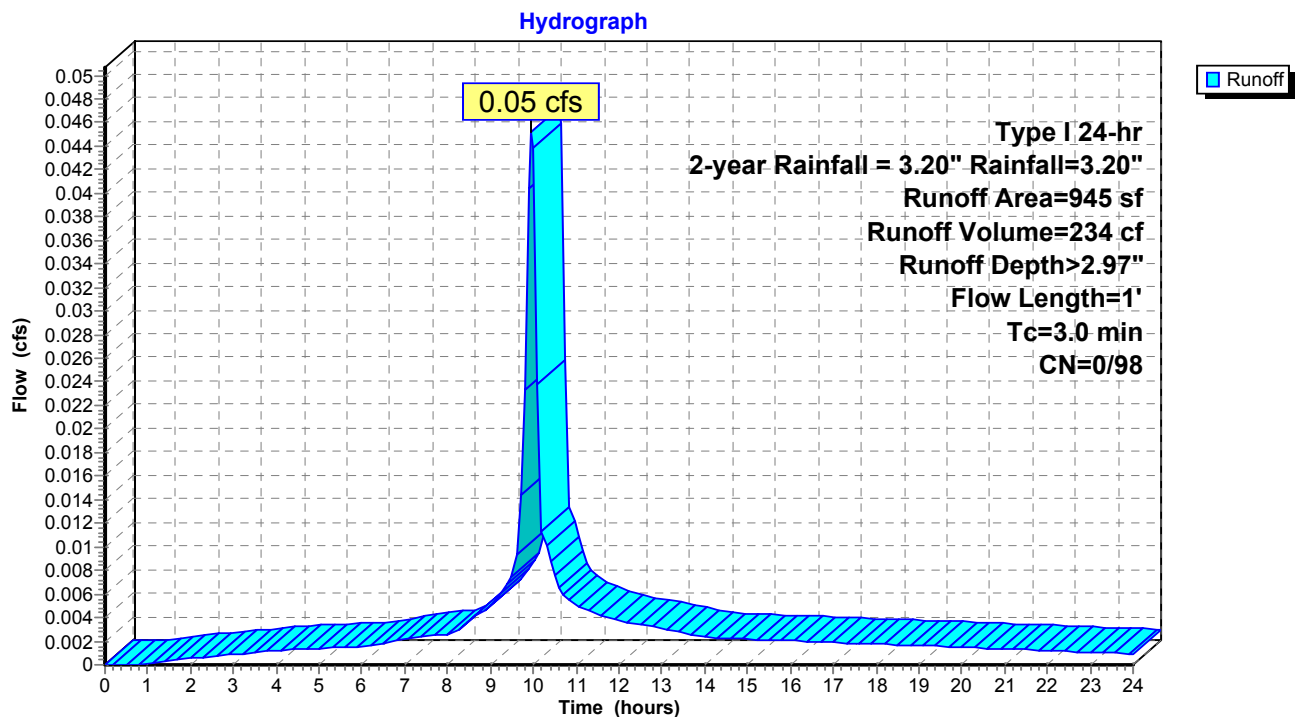
Runoff = 0.05 cfs @ 9.96 hrs, Volume= 234 cf, Depth> 2.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt = 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
945	98	Roofs, HSG A
945	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1				Total, Increased to minimum Tc = 3.0 min

Subcatchment SC-14: Residence Roof, South Part, With Planters



Summary for Subcatchment SC-15: Lower Level Patio

[49] Hint: $T_c < 2dt$ may require smaller dt

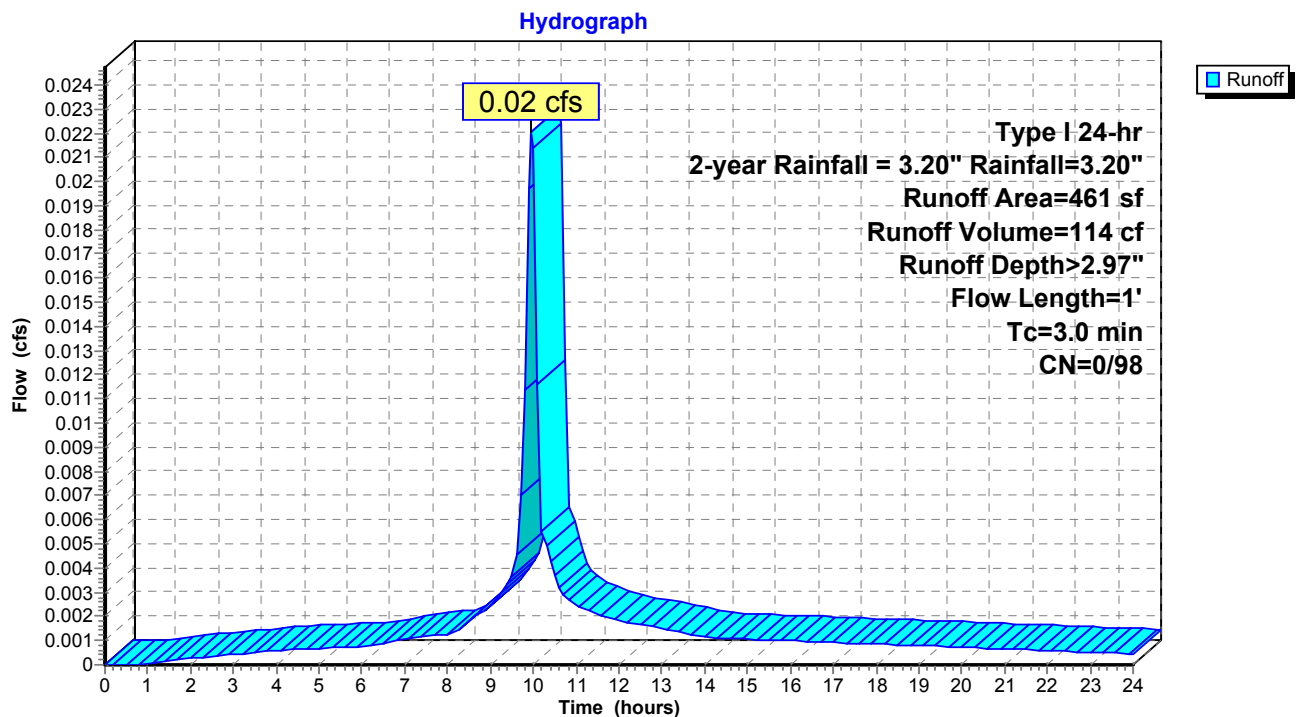
Runoff = 0.02 cfs @ 9.96 hrs, Volume= 114 cf, Depth> 2.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
461	98	Unconnected pavement, HSG A
461	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-15: Lower Level Patio



catchment SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West

[49] Hint: Tc<2dt may require smaller dt

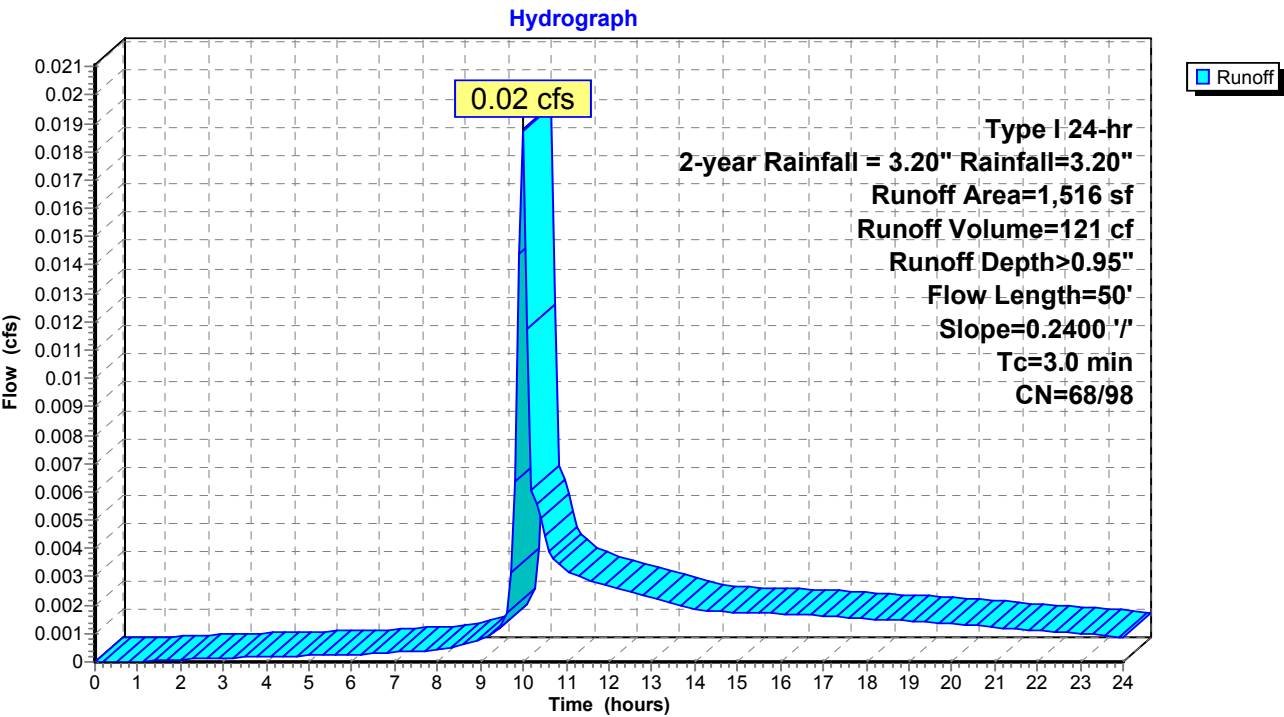
Runoff = 0.02 cfs @ 9.99 hrs, Volume= 121 cf, Depth> 0.95"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
1,365	68	<50% Grass cover, Poor, HSG A
151	98	Unconnected pavement, HSG A
1,516	71	Weighted Average
1,365	68	90.04% Pervious Area
151	98	9.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum Tc = 3.0 min			

ent SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West and E



Summary for Subcatchment SC-18: Lemonade berry mitigation area

[49] Hint: $T_c < 2dt$ may require smaller dt

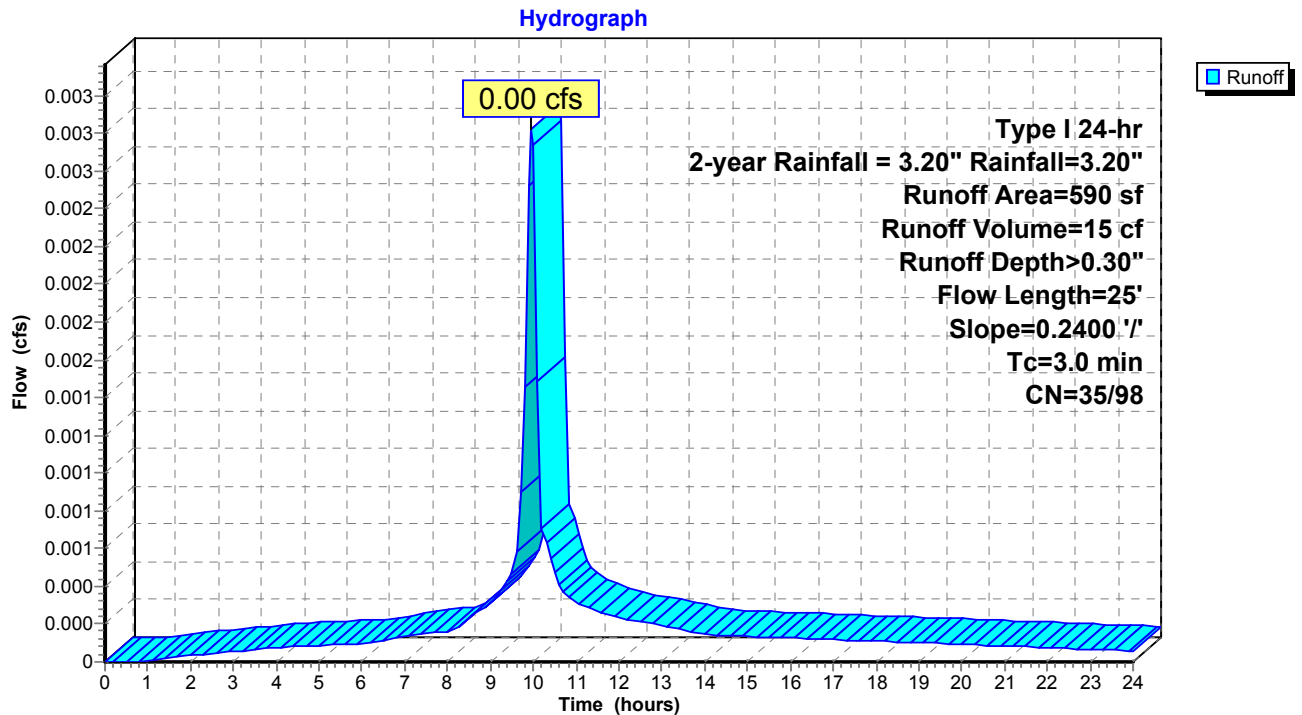
Runoff = 0.00 cfs @ 9.96 hrs, Volume= 15 cf, Depth> 0.30"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
531	35	Brush, Fair, HSG A
59	98	Unconnected pavement, HSG A
590	41	Weighted Average
531	35	90.00% Pervious Area
59	98	10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-18: Lemonade berry mitigation area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

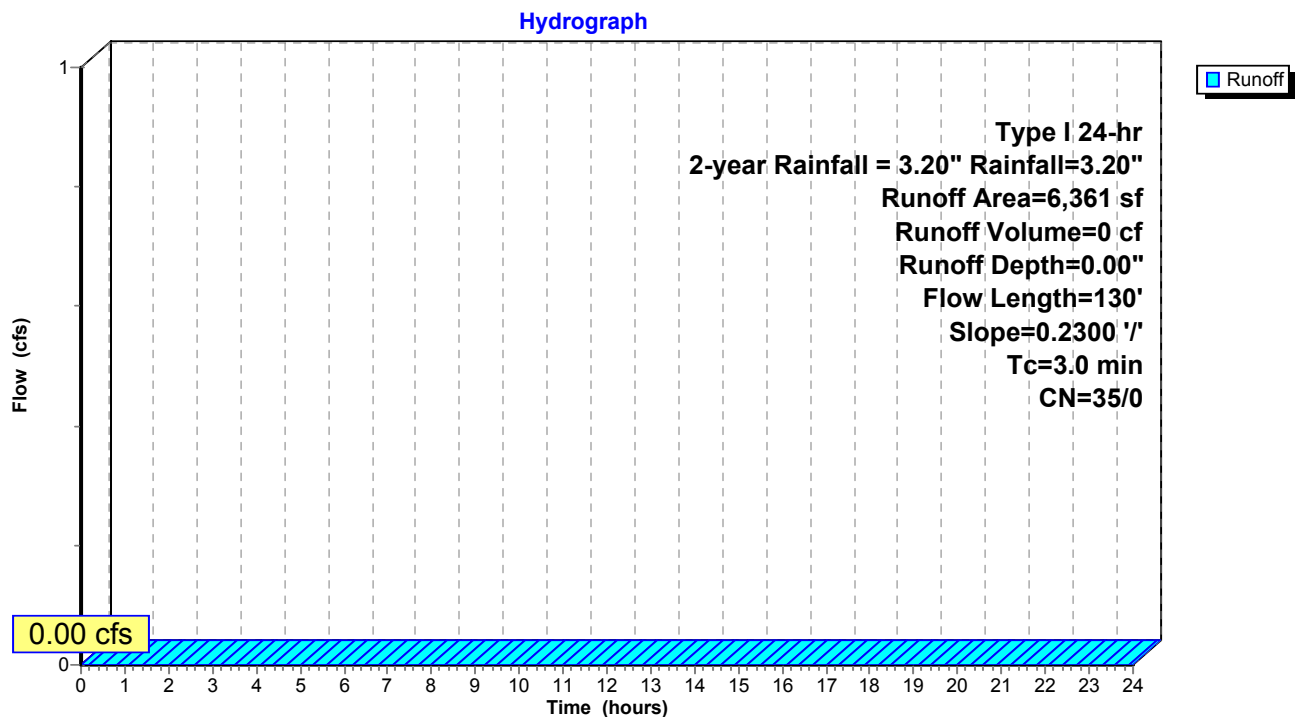
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs

Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

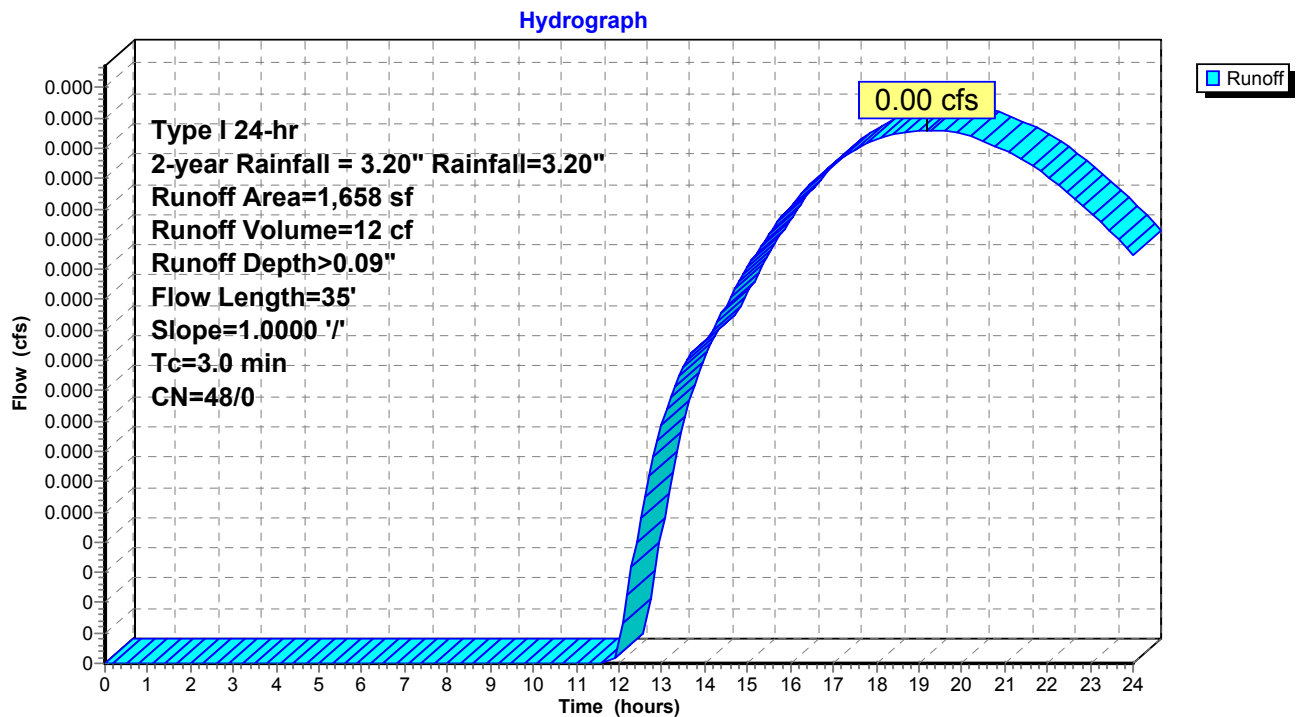
Runoff = 0.00 cfs @ 19.20 hrs, Volume= 12 cf, Depth> 0.09"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

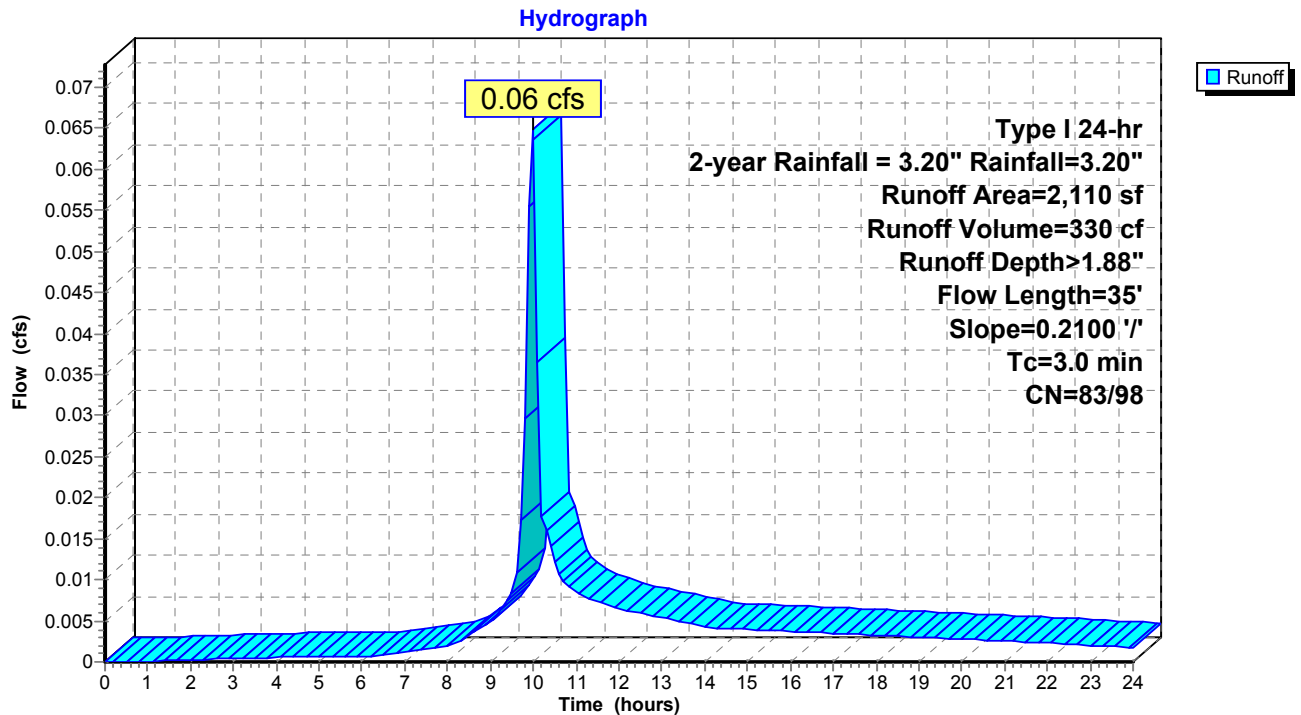
Runoff = 0.06 cfs @ 9.97 hrs, Volume= 330 cf, Depth> 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.7	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-21: Beach area



Summary for Pond 11P: Catch Basin

[57] Hint: Peaked at 95.57' (Flood elevation advised)

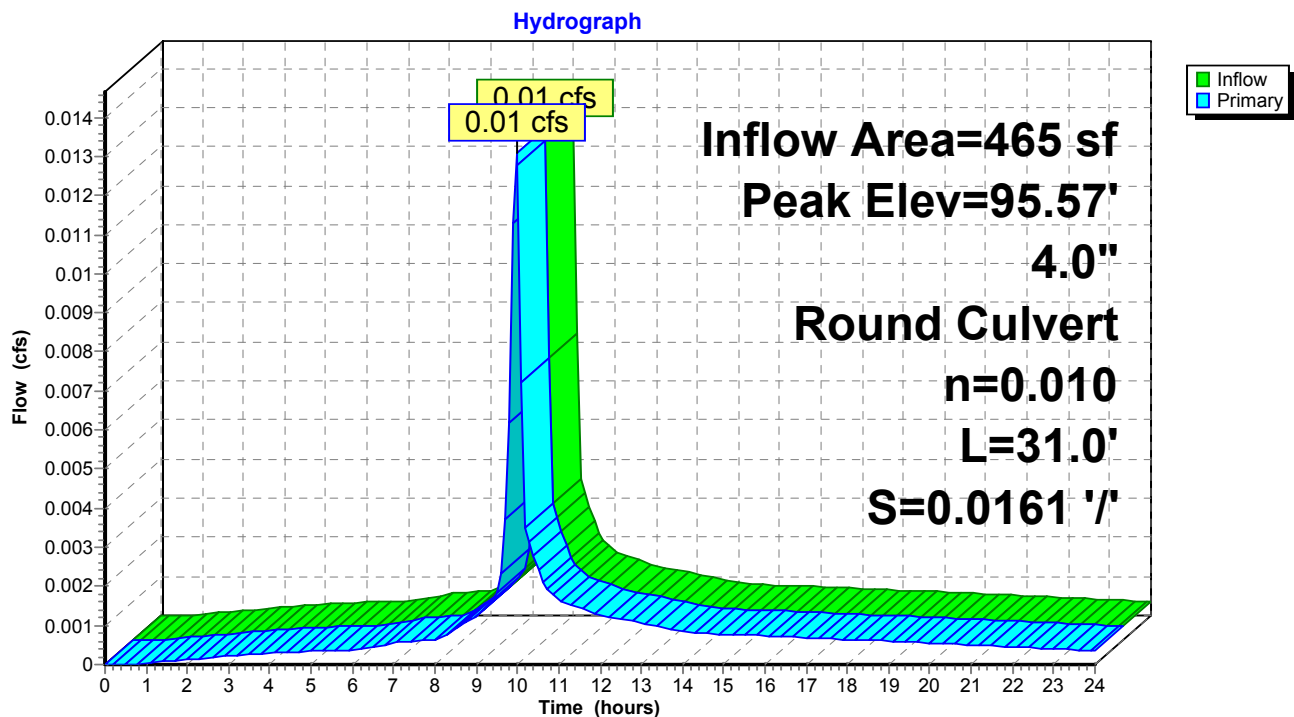
Inflow Area = 465 sf, 50.11% Impervious, Inflow Depth > 1.85" for 2-year Rainfall = 3.20" event
 Inflow = 0.01 cfs @ 9.97 hrs, Volume= 72 cf
 Outflow = 0.01 cfs @ 9.97 hrs, Volume= 72 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 9.97 hrs, Volume= 72 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.57' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0161 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 9.97 hrs HW=95.57' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.01 cfs @ 0.91 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Catch Basin

[57] Hint: Peaked at 95.56' (Flood elevation advised)

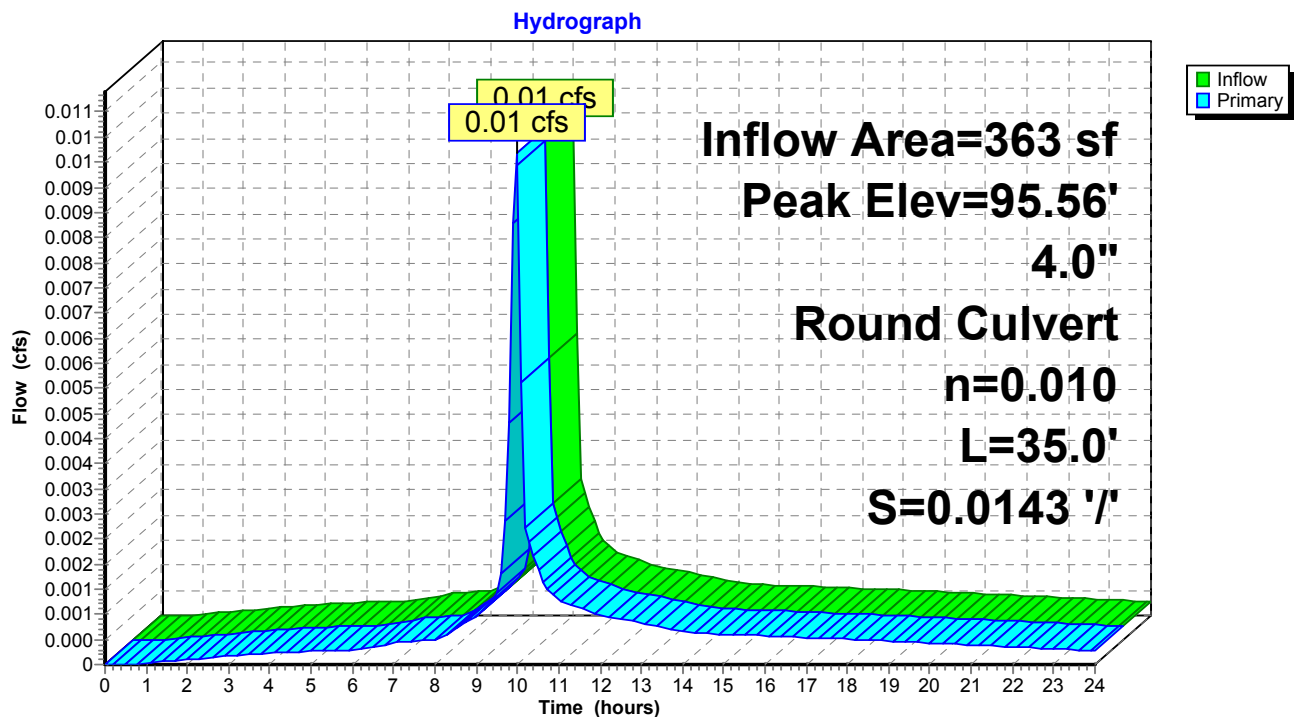
Inflow Area = 363 sf, 49.86% Impervious, Inflow Depth > 1.85" for 2-year Rainfall = 3.20" event
 Inflow = 0.01 cfs @ 9.97 hrs, Volume= 56 cf
 Outflow = 0.01 cfs @ 9.97 hrs, Volume= 56 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 9.97 hrs, Volume= 56 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.56' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0143 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 9.97 hrs HW=95.56' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.01 cfs @ 0.85 fps)

Pond 12P: Catch Basin



Summary for Pond 14P: Catch Basin

[57] Hint: Peaked at 96.14' (Flood elevation advised)

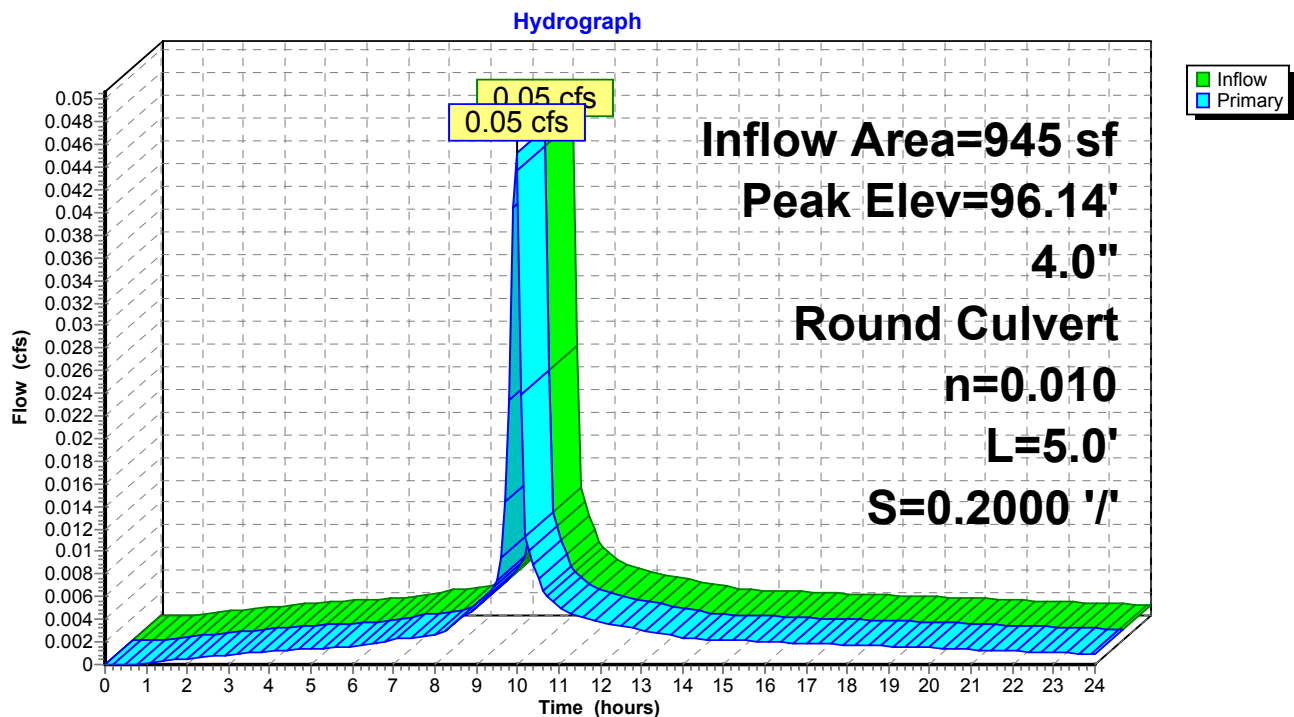
Inflow Area = 945 sf, 100.00% Impervious, Inflow Depth > 2.97" for 2-year Rainfall = 3.20" event
 Inflow = 0.05 cfs @ 9.96 hrs, Volume= 234 cf
 Outflow = 0.05 cfs @ 9.96 hrs, Volume= 234 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 9.96 hrs, Volume= 234 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 96.14' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	96.00'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.00' / 95.00' S= 0.2000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.04 cfs @ 9.96 hrs HW=96.14' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.04 cfs @ 1.26 fps)

Pond 14P: Catch Basin



Summary for Pond 15P: Catch Basin

[57] Hint: Peaked at 95.60' (Flood elevation advised)

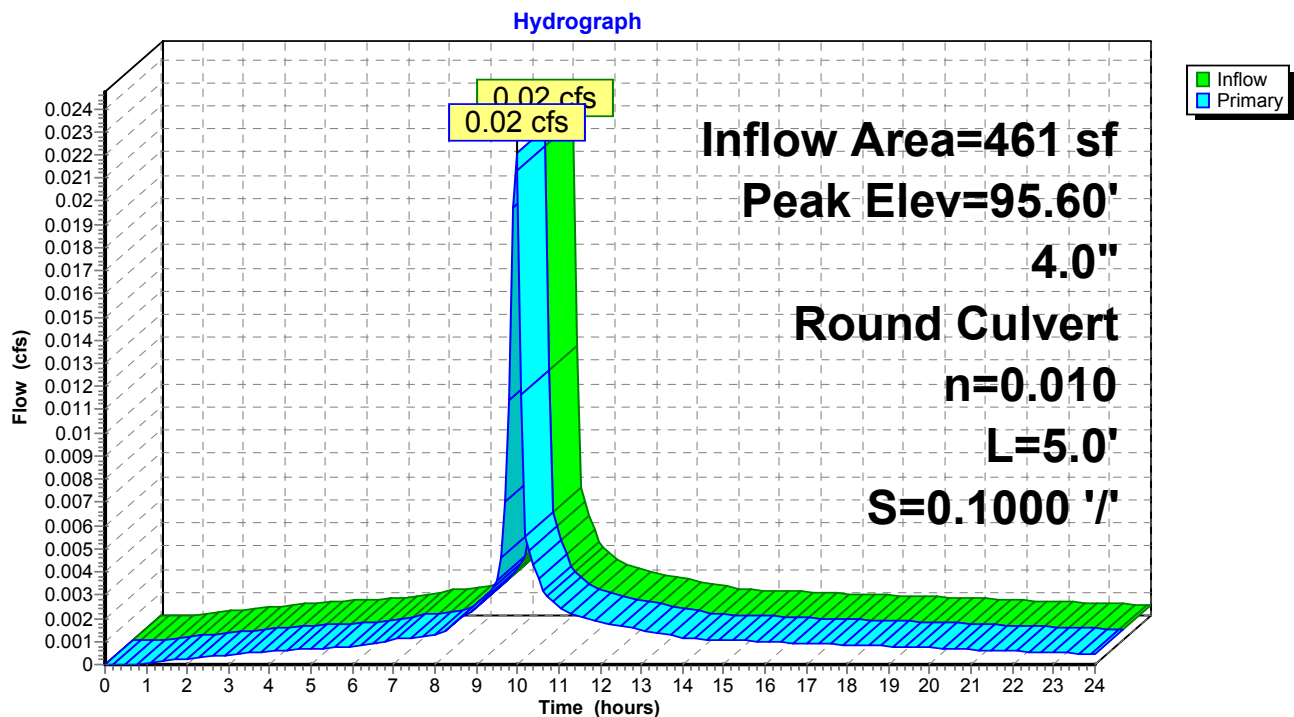
Inflow Area = 461 sf, 100.00% Impervious, Inflow Depth > 2.97" for 2-year Rainfall = 3.20" event
 Inflow = 0.02 cfs @ 9.96 hrs, Volume= 114 cf
 Outflow = 0.02 cfs @ 9.96 hrs, Volume= 114 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.96 hrs, Volume= 114 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.60' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.96 hrs HW=95.59' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.02 cfs @ 1.04 fps)

Pond 15P: Catch Basin



Summary for Pond WST-3: Water Storage Tank - 3

Inflow Area = 2,234 sf, 81.47% Impervious, Inflow Depth > 7.21" for 2-year Rainfall = 3.20" event
 Inflow = 0.10 cfs @ 9.97 hrs, Volume= 1,343 cf, Incl. 0.01 cfs Base Flow
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 92.24' @ 24.00 hrs Surf.Area= 256 sf Storage= 1,340 cf

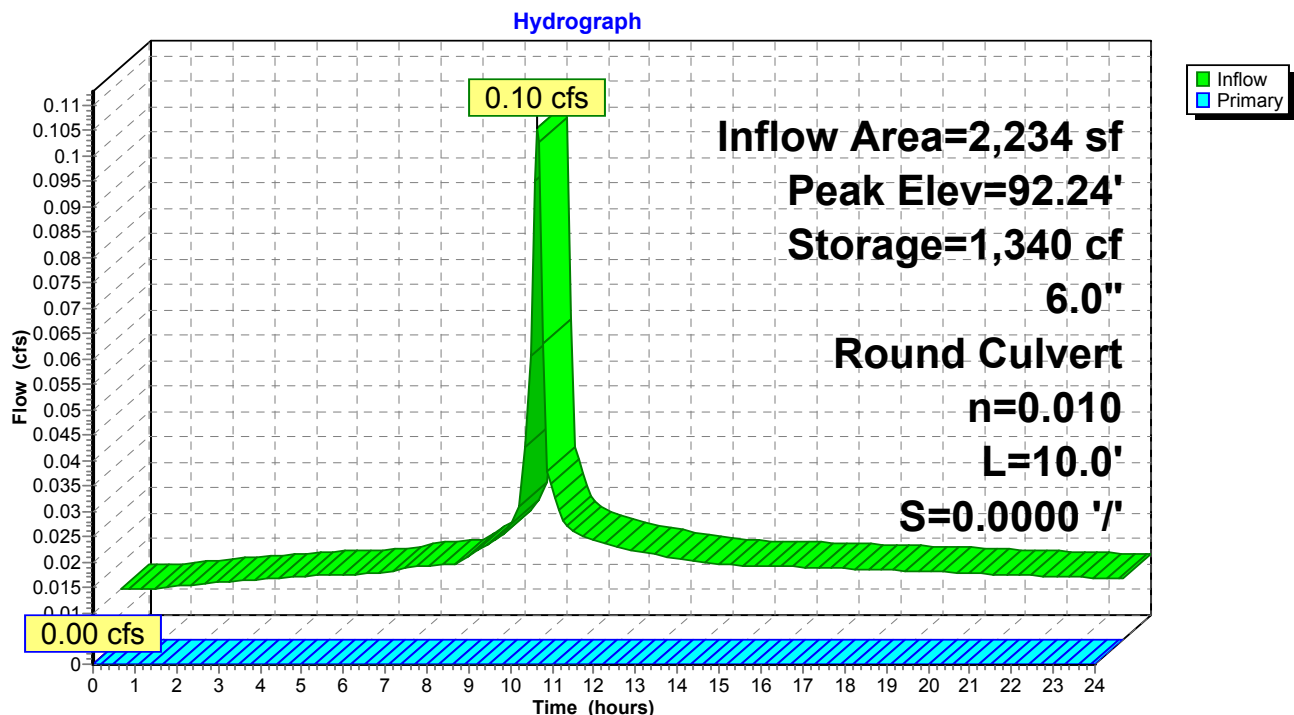
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	87.00'	2,048 cf	96.0" W x 96.0" H Box Pipe Storage L= 32.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	95.00'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.00' / 95.00' S= 0.0000 ' / ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=87.01' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-3: Water Storage Tank - 3



1925 ECDLL_Post Construction Analysis Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Prepared by {enter your company name here}

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: Upper West Side Yard Runoff Area=465 sf 50.11% Impervious Runoff Depth>2.99"
Flow Length=78' Slope=0.4300 '/' Tc=3.0 min CN=68/98 Runoff=0.02 cfs 116 cf

Subcatchment SC-12: Upper East Side Yard Runoff Area=363 sf 49.86% Impervious Runoff Depth>2.98"
Flow Length=65' Slope=0.3600 '/' Tc=3.0 min CN=68/98 Runoff=0.02 cfs 90 cf

Subcatchment SC-14: Residence Roof, Runoff Area=945 sf 100.00% Impervious Runoff Depth>4.37"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.07 cfs 344 cf

Subcatchment SC-15: Lower Level Patio Runoff Area=461 sf 100.00% Impervious Runoff Depth>4.37"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.03 cfs 168 cf

Subcatchment SC-17: Restored Temporary Runoff Area=1,516 sf 9.96% Impervious Runoff Depth>1.88"
Flow Length=50' Slope=0.2400 '/' Tc=3.0 min CN=68/98 Runoff=0.04 cfs 238 cf

Subcatchment SC-18: Lemonade berry Runoff Area=590 sf 10.00% Impervious Runoff Depth>0.47"
Flow Length=25' Slope=0.2400 '/' Tc=3.0 min CN=35/98 Runoff=0.00 cfs 23 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth>0.04"
Flow Length=130' Slope=0.2300 '/' Tc=3.0 min CN=35/0 Runoff=0.00 cfs 22 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.45"
Flow Length=35' Slope=1.0000 '/' Tc=3.0 min CN=48/0 Runoff=0.00 cfs 62 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>3.13"
Flow Length=35' Slope=0.2100 '/' Tc=3.0 min CN=83/98 Runoff=0.11 cfs 550 cf

Pond 11P: Catch Basin Peak Elev=95.60' Inflow=0.02 cfs 116 cf
4.0" Round Culvert n=0.010 L=31.0' S=0.0161 '/' Outflow=0.02 cfs 116 cf

Pond 12P: Catch Basin Peak Elev=95.58' Inflow=0.02 cfs 90 cf
4.0" Round Culvert n=0.010 L=35.0' S=0.0143 '/' Outflow=0.02 cfs 90 cf

Pond 14P: Catch Basin Peak Elev=96.17' Inflow=0.07 cfs 344 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.2000 '/' Outflow=0.07 cfs 344 cf

Pond 15P: Catch Basin Peak Elev=95.62' Inflow=0.03 cfs 168 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/' Outflow=0.03 cfs 168 cf

Pond WST-3: Water Storage Tank - 3 Peak Elev=93.19' Storage=1,584 cf Inflow=0.15 cfs 1,586 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.00 cfs 0 cf

Total Runoff Area = 14,469 sf Runoff Volume = 1,613 cf Average Runoff Depth = 1.34"
83.09% Pervious = 12,023 sf 16.91% Impervious = 2,446 sf

Summary for Subcatchment SC-11: Upper West Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

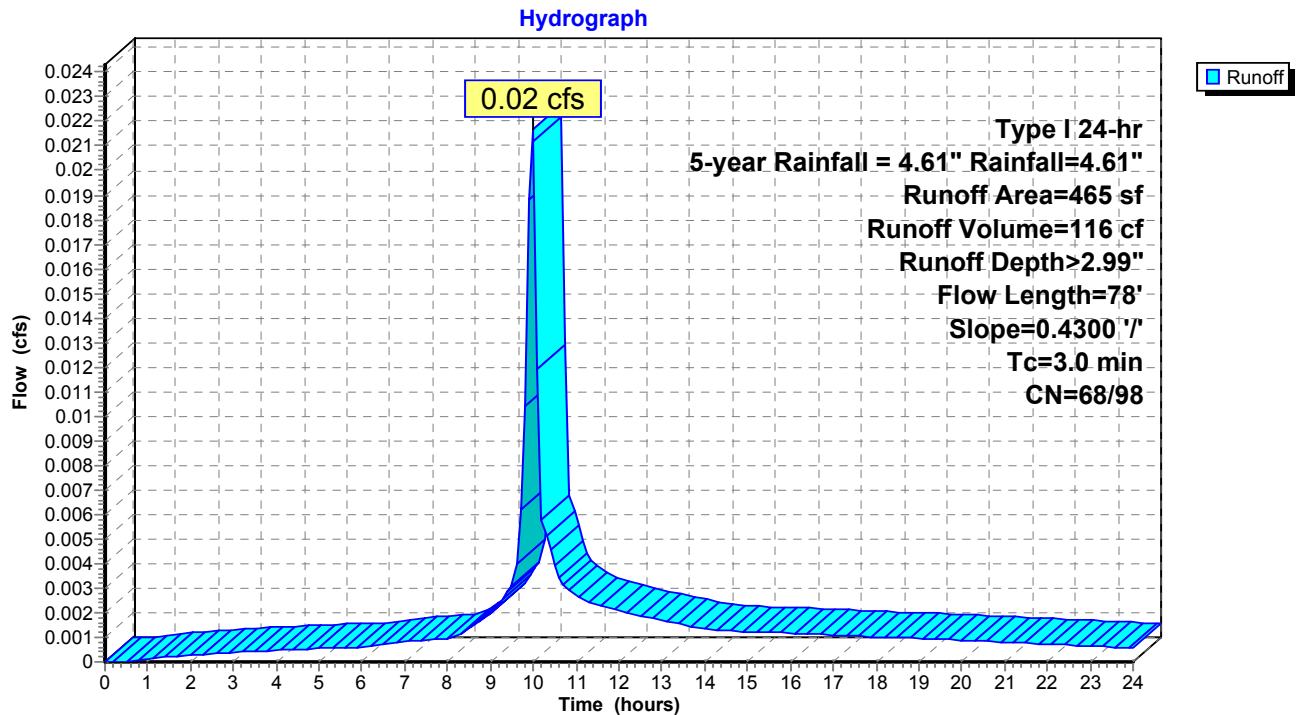
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 116 cf, Depth> 2.99"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
232	68	<50% Grass cover, Poor, HSG A
233	98	Unconnected pavement, HSG A
465	83	Weighted Average
232	68	49.89% Pervious Area
233	98	50.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
1.0	78	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-11: Upper West Side Yard



Summary for Subcatchment SC-12: Upper East Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

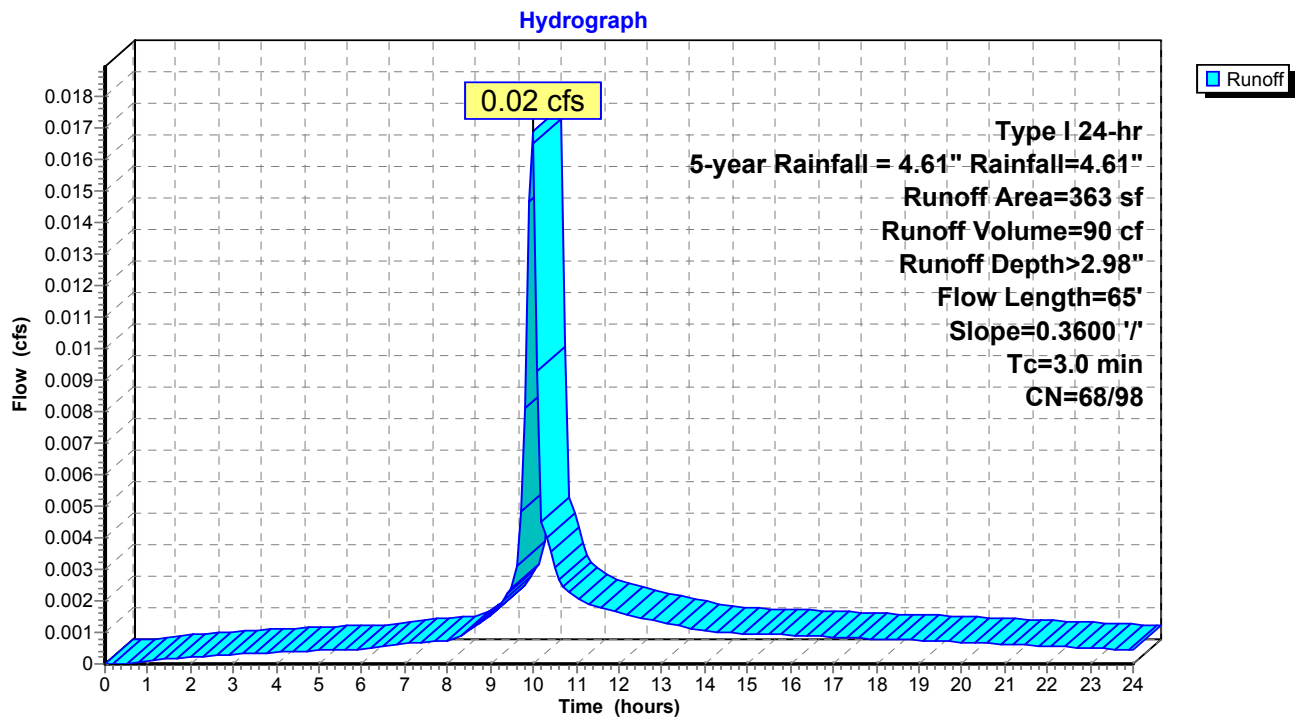
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 90 cf, Depth> 2.98"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
182	68	<50% Grass cover, Poor, HSG A
181	98	Unconnected pavement, HSG A
363	83	Weighted Average
182	68	50.14% Pervious Area
181	98	49.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	65	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-12: Upper East Side Yard



Summary for Subcatchment SC-14: Residence Roof, South Part, With Planters

[49] Hint: $T_c < 2dt$ may require smaller dt

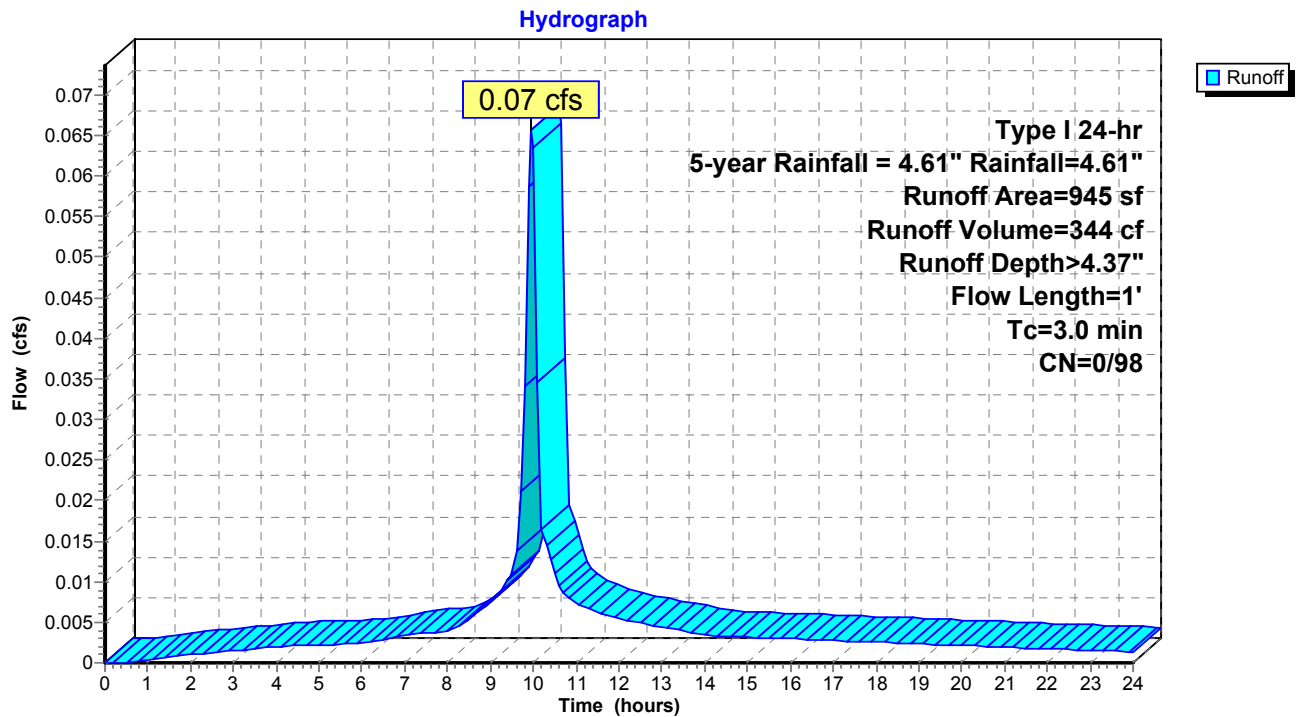
Runoff = 0.07 cfs @ 9.96 hrs, Volume= 344 cf, Depth> 4.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
945	98	Roofs, HSG A
945	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1				Total, Increased to minimum Tc = 3.0 min

Subcatchment SC-14: Residence Roof, South Part, With Planters



Summary for Subcatchment SC-15: Lower Level Patio

[49] Hint: $T_c < 2dt$ may require smaller dt

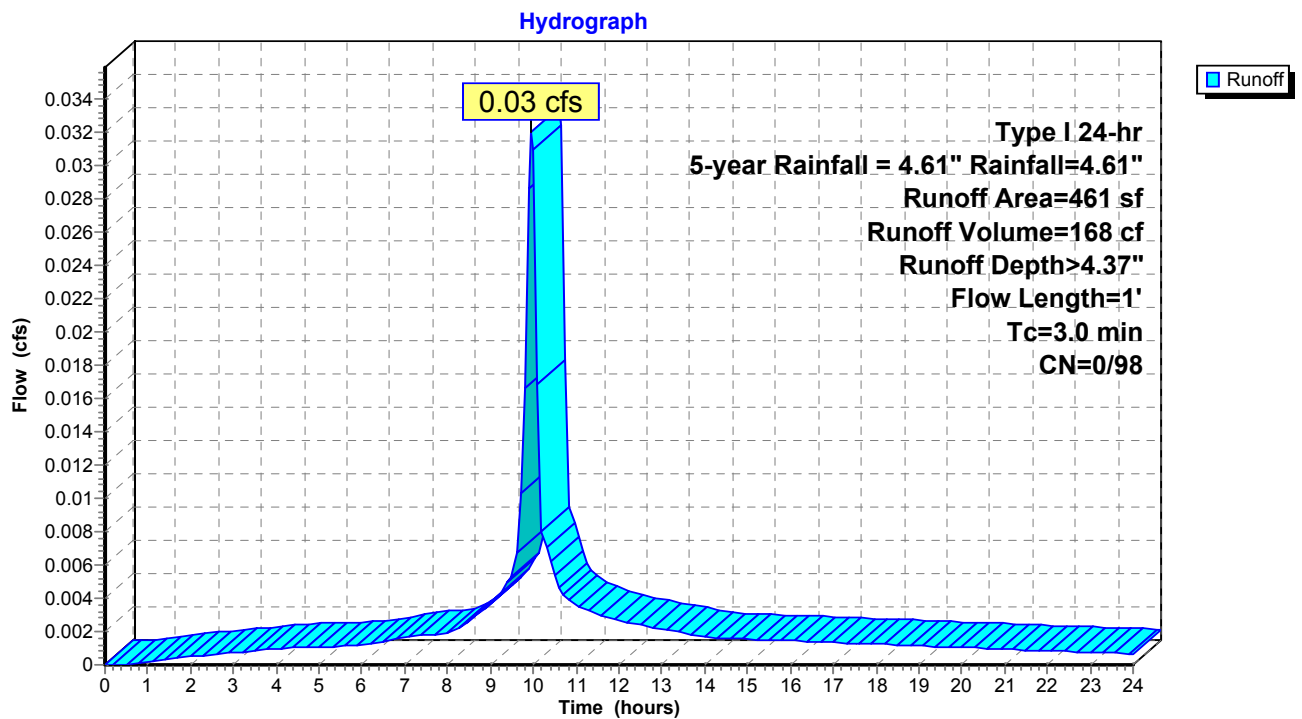
Runoff = 0.03 cfs @ 9.96 hrs, Volume= 168 cf, Depth> 4.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
461	98	Unconnected pavement, HSG A
461	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-15: Lower Level Patio



Catchment SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West

[49] Hint: $T_c < 2dt$ may require smaller dt

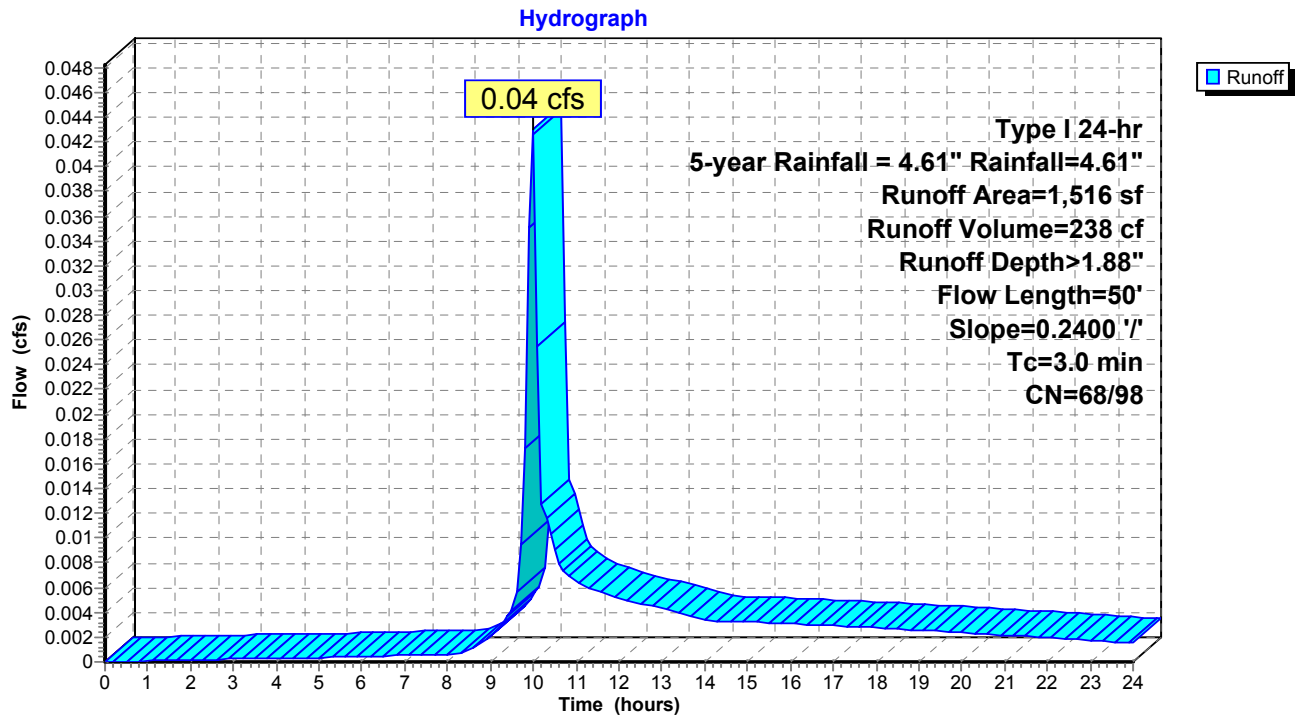
Runoff = 0.04 cfs @ 9.98 hrs, Volume= 238 cf, Depth> 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
1,365	68	<50% Grass cover, Poor, HSG A
151	98	Unconnected pavement, HSG A
1,516	71	Weighted Average
1,365	68	90.04% Pervious Area
151	98	9.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum Tc = 3.0 min			

Catchment SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West and E



Summary for Subcatchment SC-18: Lemonade berry mitigation area

[49] Hint: $T_c < 2dt$ may require smaller dt

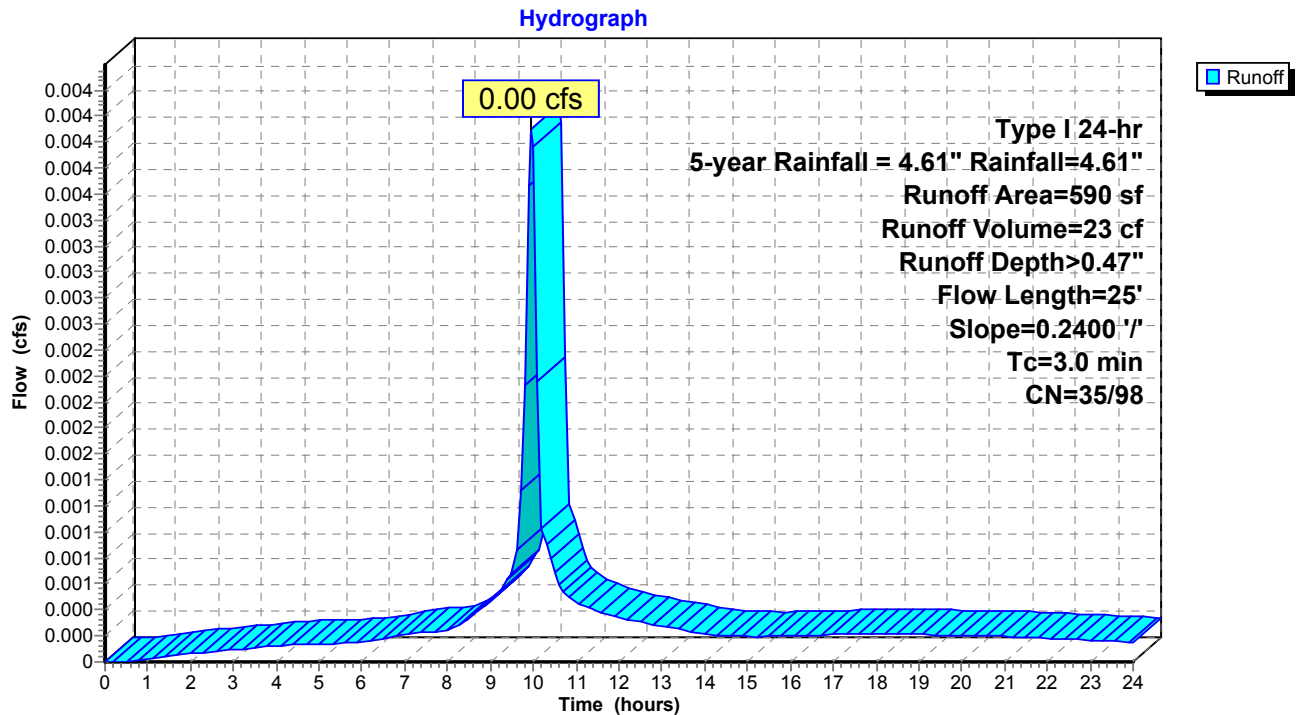
Runoff = 0.00 cfs @ 9.96 hrs, Volume= 23 cf, Depth> 0.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
531	35	Brush, Fair, HSG A
59	98	Unconnected pavement, HSG A
590	41	Weighted Average
531	35	90.00% Pervious Area
59	98	10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.5	25	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-18: Lemonade berry mitigation area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

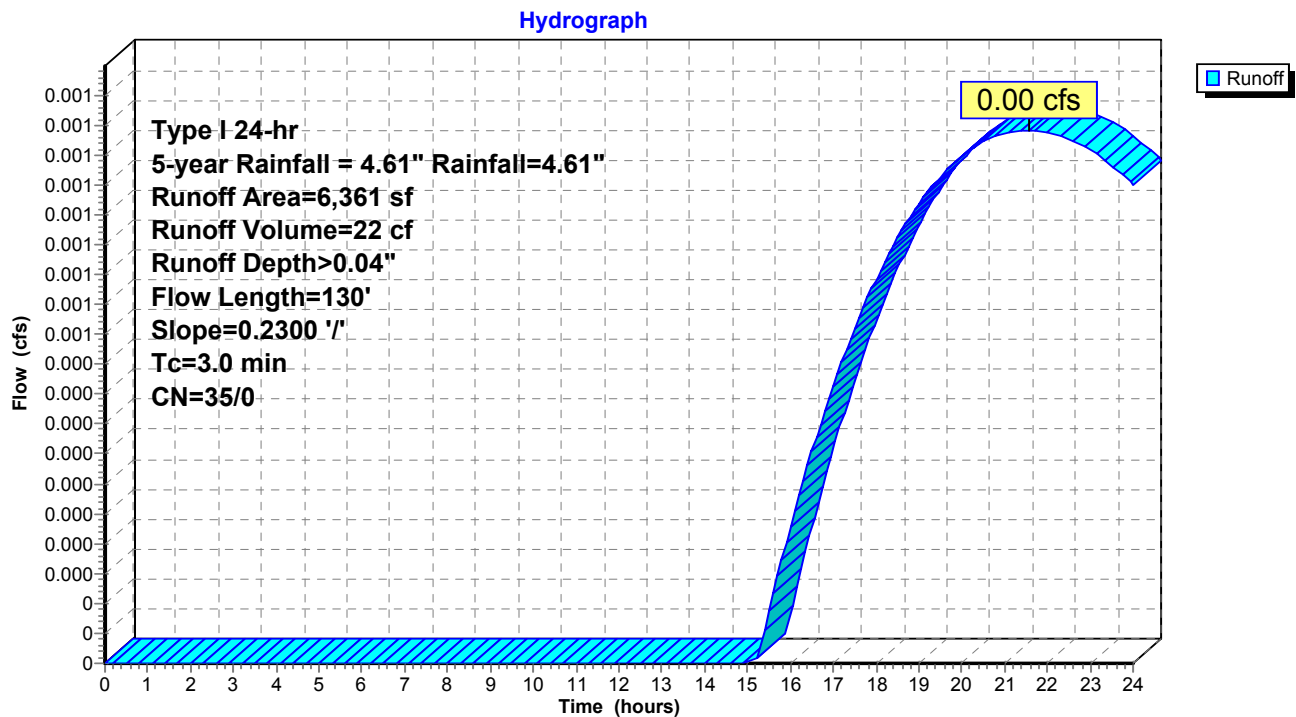
Runoff = 0.00 cfs @ 21.55 hrs, Volume= 22 cf, Depth> 0.04"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

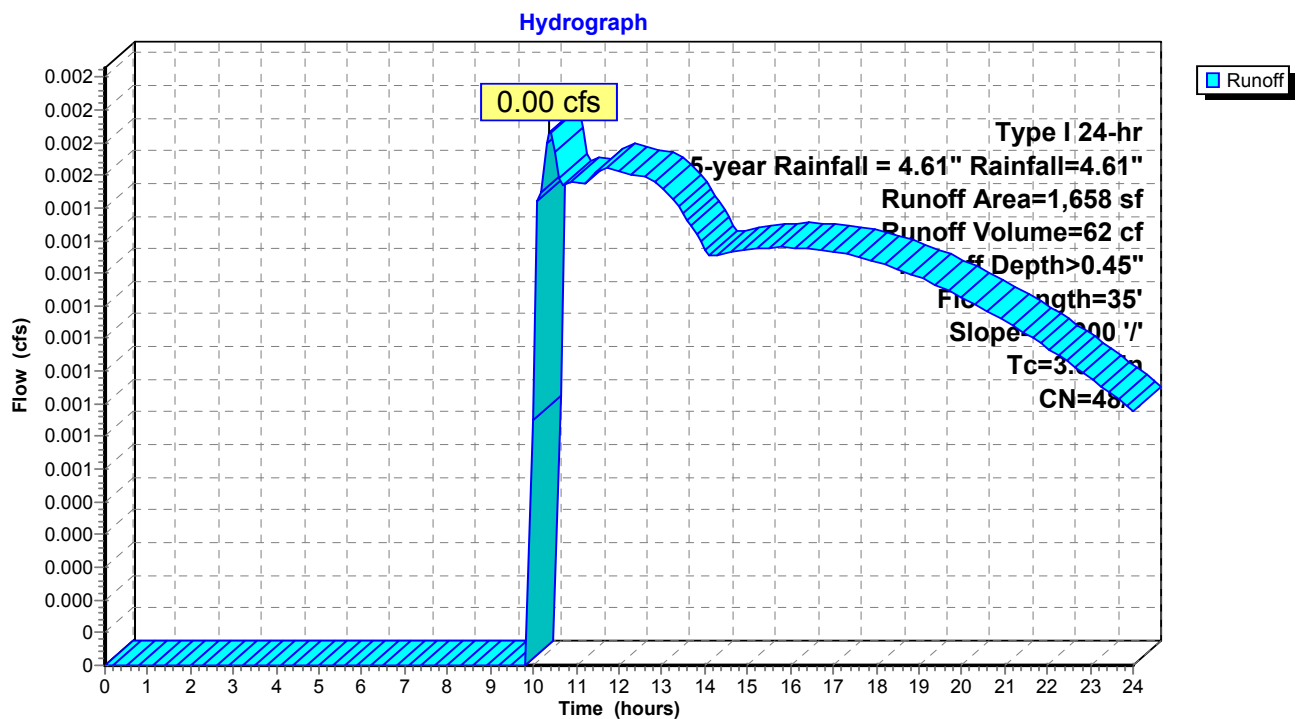
Runoff = 0.00 cfs @ 10.39 hrs, Volume= 62 cf, Depth> 0.45"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

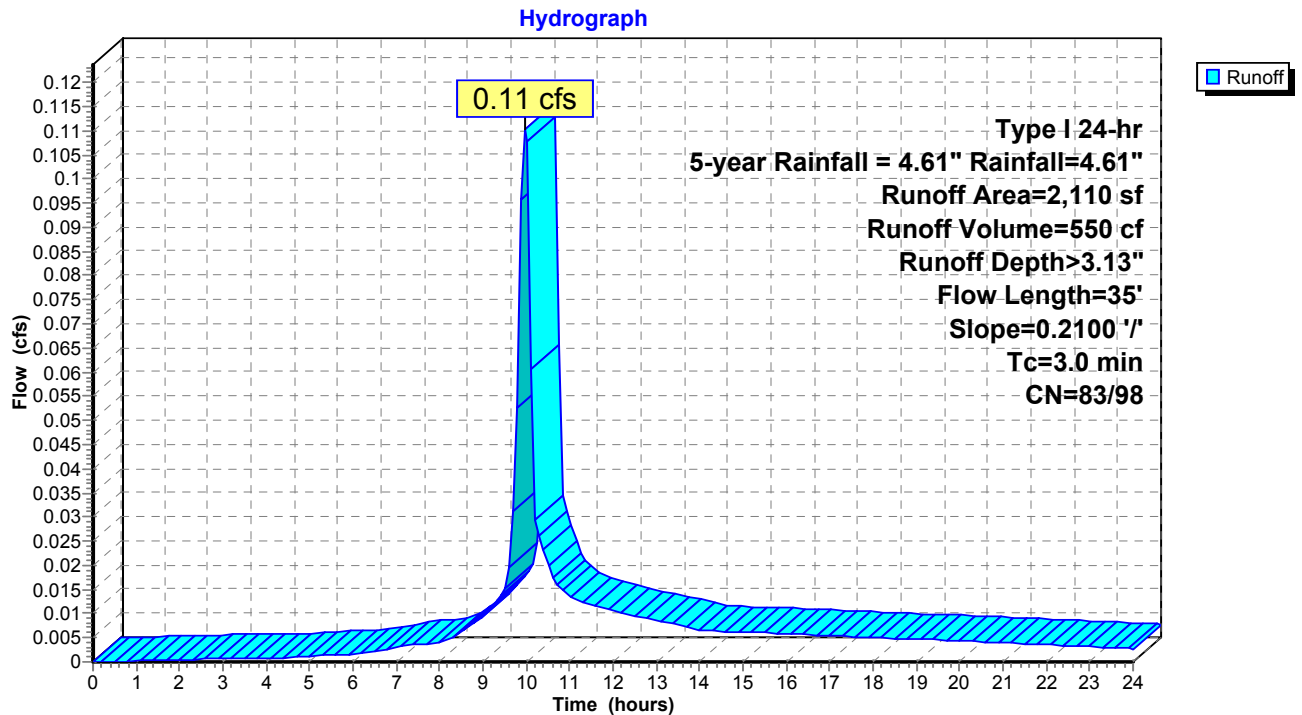
Runoff = 0.11 cfs @ 9.97 hrs, Volume= 550 cf, Depth> 3.13"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.7	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-21: Beach area



Summary for Pond 11P: Catch Basin

[57] Hint: Peaked at 95.60' (Flood elevation advised)

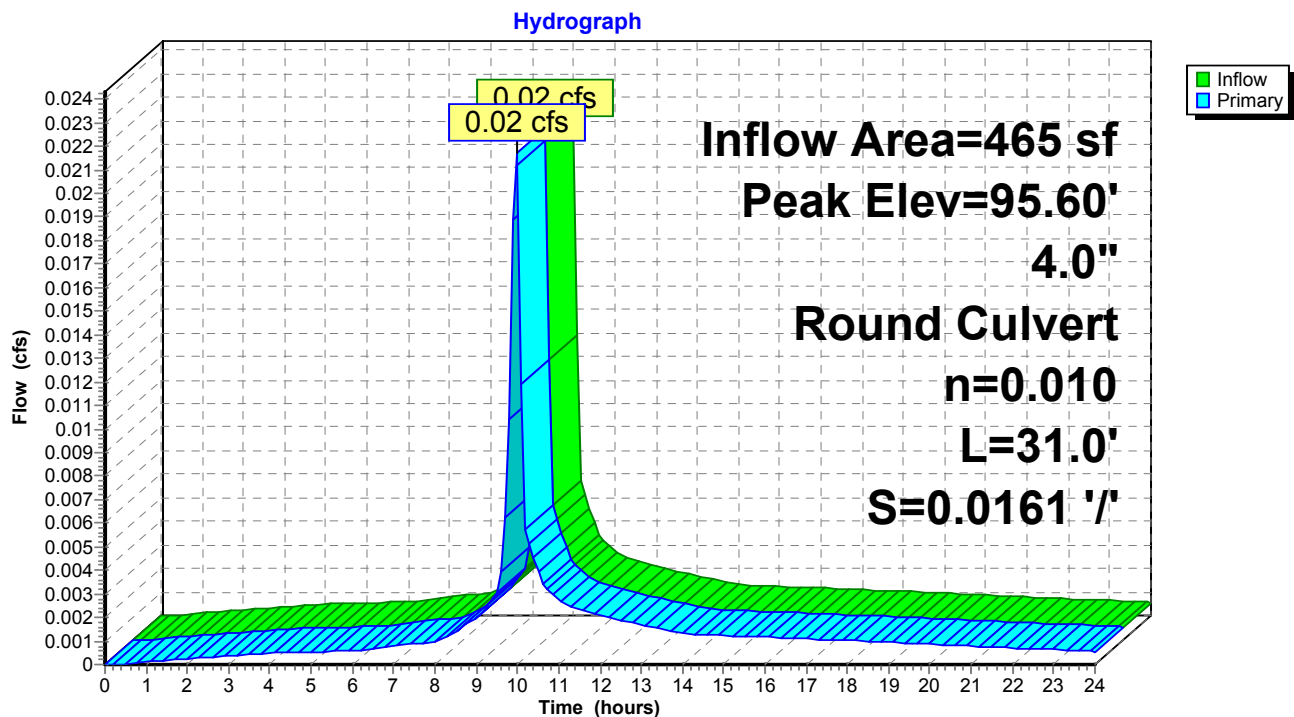
Inflow Area = 465 sf, 50.11% Impervious, Inflow Depth > 2.99" for 5-year Rainfall = 4.61" event
 Inflow = 0.02 cfs @ 9.97 hrs, Volume= 116 cf
 Outflow = 0.02 cfs @ 9.97 hrs, Volume= 116 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.97 hrs, Volume= 116 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.60' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0161 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.97 hrs HW=95.59' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.02 cfs @ 1.04 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Catch Basin

[57] Hint: Peaked at 95.58' (Flood elevation advised)

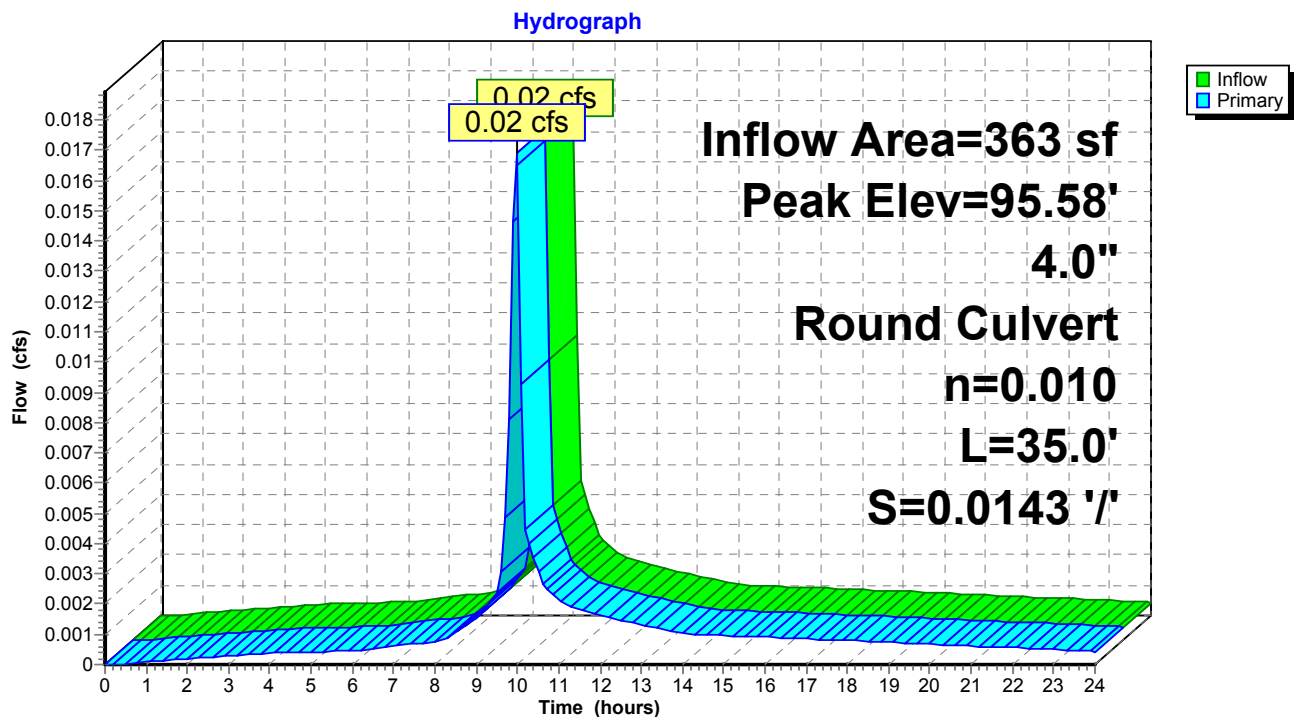
Inflow Area = 363 sf, 49.86% Impervious, Inflow Depth > 2.98" for 5-year Rainfall = 4.61" event
 Inflow = 0.02 cfs @ 9.97 hrs, Volume= 90 cf
 Outflow = 0.02 cfs @ 9.97 hrs, Volume= 90 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.97 hrs, Volume= 90 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.58' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0143 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.97 hrs HW=95.58' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.02 cfs @ 0.97 fps)

Pond 12P: Catch Basin



Summary for Pond 14P: Catch Basin

[57] Hint: Peaked at 96.17' (Flood elevation advised)

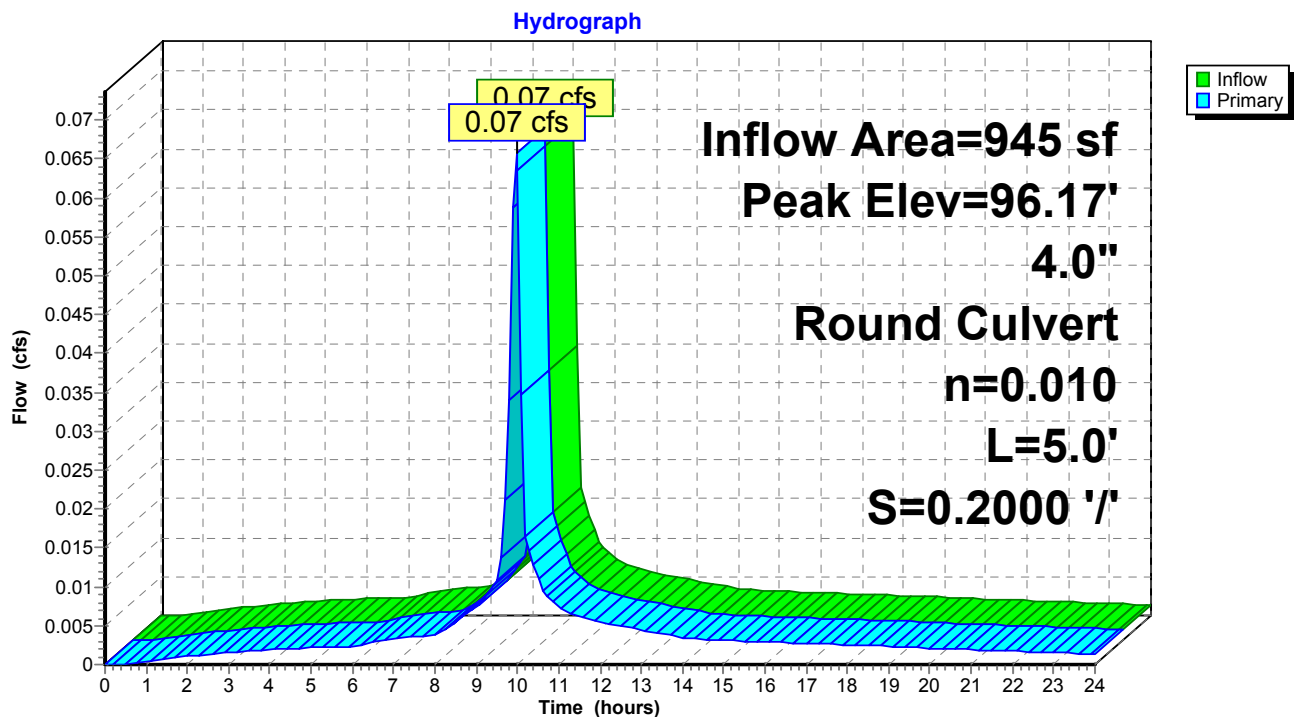
Inflow Area = 945 sf, 100.00% Impervious, Inflow Depth > 4.37" for 5-year Rainfall = 4.61" event
 Inflow = 0.07 cfs @ 9.96 hrs, Volume= 344 cf
 Outflow = 0.07 cfs @ 9.96 hrs, Volume= 344 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.07 cfs @ 9.96 hrs, Volume= 344 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 96.17' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	96.00'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.00' / 95.00' S= 0.2000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.06 cfs @ 9.96 hrs HW=96.17' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.06 cfs @ 1.40 fps)

Pond 14P: Catch Basin



Summary for Pond 15P: Catch Basin

[57] Hint: Peaked at 95.62' (Flood elevation advised)

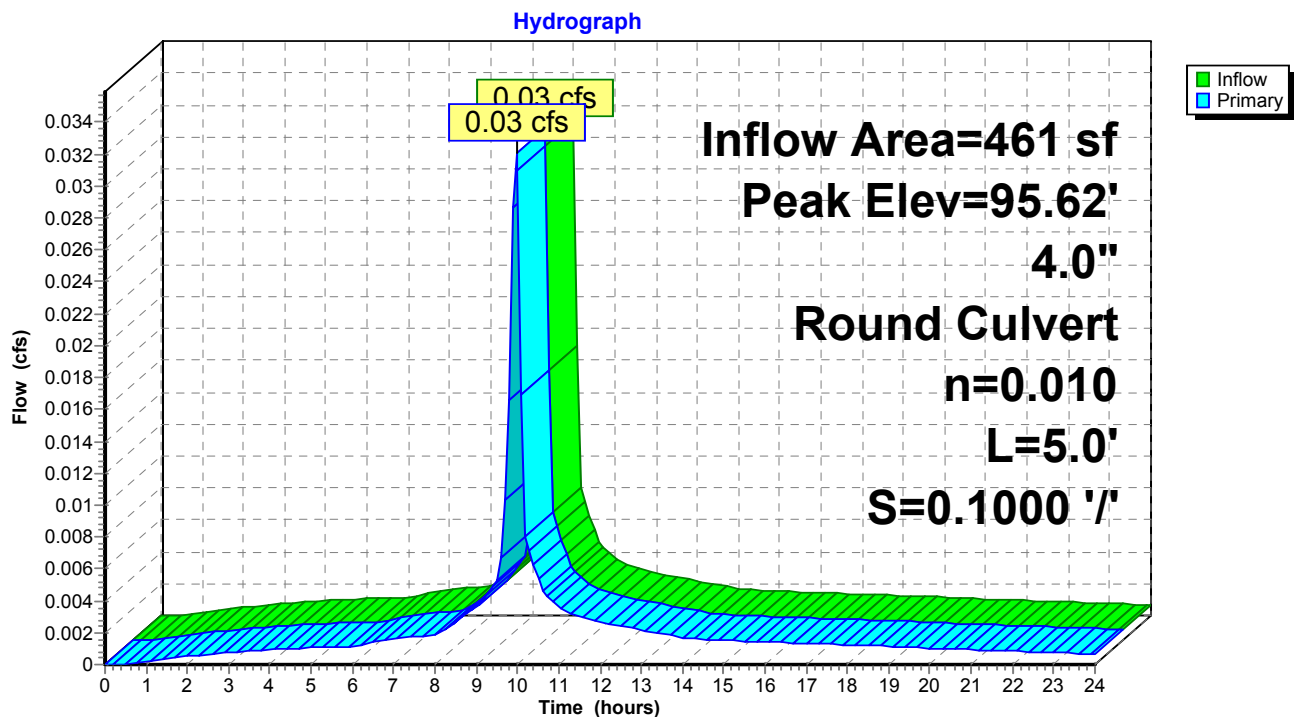
Inflow Area = 461 sf, 100.00% Impervious, Inflow Depth > 4.37" for 5-year Rainfall = 4.61" event
 Inflow = 0.03 cfs @ 9.96 hrs, Volume= 168 cf
 Outflow = 0.03 cfs @ 9.96 hrs, Volume= 168 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.03 cfs @ 9.96 hrs, Volume= 168 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.62' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.03 cfs @ 9.96 hrs HW=95.61' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.03 cfs @ 1.15 fps)

Pond 15P: Catch Basin



Summary for Pond WST-3: Water Storage Tank - 3

Inflow Area = 2,234 sf, 81.47% Impervious, Inflow Depth > 8.52" for 5-year Rainfall = 4.61" event
 Inflow = 0.15 cfs @ 9.97 hrs, Volume= 1,586 cf, Incl. 0.01 cfs Base Flow
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 93.19' @ 24.00 hrs Surf.Area= 256 sf Storage= 1,584 cf

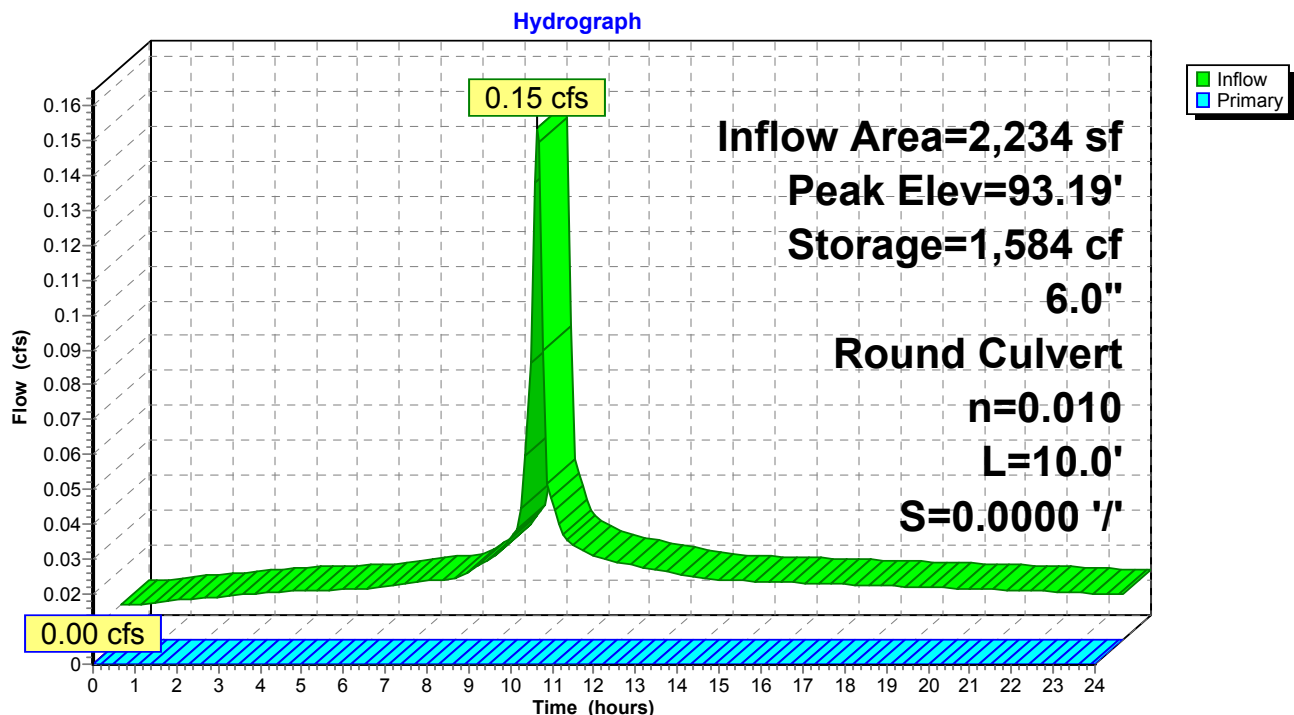
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	87.00'	2,048 cf	96.0" W x 96.0" H Box Pipe Storage L= 32.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	95.00'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.00' / 95.00' S= 0.0000 ' / ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=87.01' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-3: Water Storage Tank - 3



1925 ECDLL_Post Construction Analysis Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Prepared by {enter your company name here}

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: Upper West Side Yard Runoff Area=465 sf 50.11% Impervious Runoff Depth>3.80"
Flow Length=78' Slope=0.4300 '/' Tc=3.0 min CN=68/98 Runoff=0.03 cfs 147 cf

Subcatchment SC-12: Upper East Side Yard Runoff Area=363 sf 49.86% Impervious Runoff Depth>3.79"
Flow Length=65' Slope=0.3600 '/' Tc=3.0 min CN=68/98 Runoff=0.02 cfs 115 cf

Subcatchment SC-14: Residence Roof, Runoff Area=945 sf 100.00% Impervious Runoff Depth>5.31"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.08 cfs 418 cf

Subcatchment SC-15: Lower Level Patio Runoff Area=461 sf 100.00% Impervious Runoff Depth>5.31"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.04 cfs 204 cf

Subcatchment SC-17: Restored Temporary Runoff Area=1,516 sf 9.96% Impervious Runoff Depth>2.58"
Flow Length=50' Slope=0.2400 '/' Tc=3.0 min CN=68/98 Runoff=0.06 cfs 326 cf

Subcatchment SC-18: Lemonade berry Runoff Area=590 sf 10.00% Impervious Runoff Depth>0.68"
Flow Length=25' Slope=0.2400 '/' Tc=3.0 min CN=35/98 Runoff=0.00 cfs 33 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth>0.16"
Flow Length=130' Slope=0.2300 '/' Tc=3.0 min CN=35/0 Runoff=0.00 cfs 87 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.80"
Flow Length=35' Slope=1.0000 '/' Tc=3.0 min CN=48/0 Runoff=0.01 cfs 111 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>4.00"
Flow Length=35' Slope=0.2100 '/' Tc=3.0 min CN=83/98 Runoff=0.14 cfs 702 cf

Pond 11P: Catch Basin Peak Elev=95.61' Inflow=0.03 cfs 147 cf
4.0" Round Culvert n=0.010 L=31.0' S=0.0161 '/' Outflow=0.03 cfs 147 cf

Pond 12P: Catch Basin Peak Elev=95.60' Inflow=0.02 cfs 115 cf
4.0" Round Culvert n=0.010 L=35.0' S=0.0143 '/' Outflow=0.02 cfs 115 cf

Pond 14P: Catch Basin Peak Elev=96.19' Inflow=0.08 cfs 418 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.2000 '/' Outflow=0.08 cfs 418 cf

Pond 15P: Catch Basin Peak Elev=95.63' Inflow=0.04 cfs 204 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/' Outflow=0.04 cfs 204 cf

Pond WST-3: Water Storage Tank - 3 Peak Elev=93.83' Storage=1,749 cf Inflow=0.18 cfs 1,751 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.00 cfs 0 cf

Total Runoff Area = 14,469 sf Runoff Volume = 2,144 cf Average Runoff Depth = 1.78"
83.09% Pervious = 12,023 sf 16.91% Impervious = 2,446 sf

Summary for Subcatchment SC-11: Upper West Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

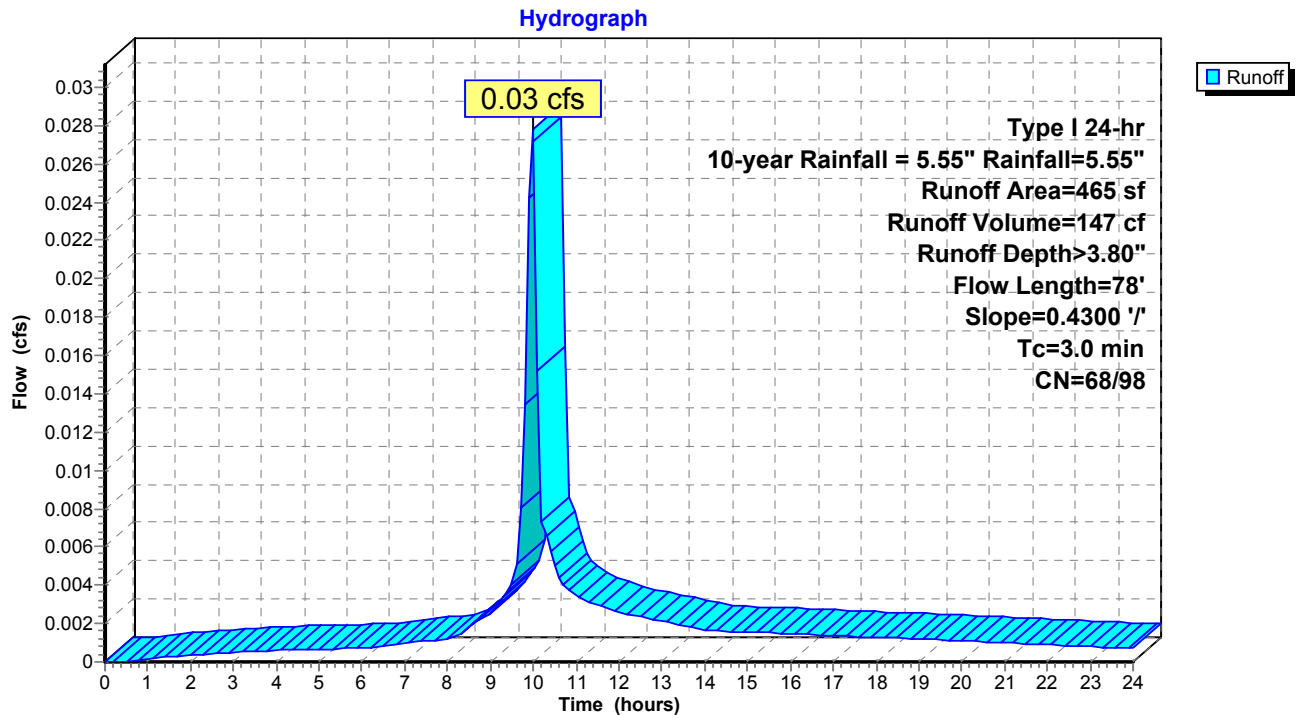
Runoff = 0.03 cfs @ 9.97 hrs, Volume= 147 cf, Depth> 3.80"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
232	68	<50% Grass cover, Poor, HSG A
233	98	Unconnected pavement, HSG A
465	83	Weighted Average
232	68	49.89% Pervious Area
233	98	50.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-11: Upper West Side Yard



Summary for Subcatchment SC-12: Upper East Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

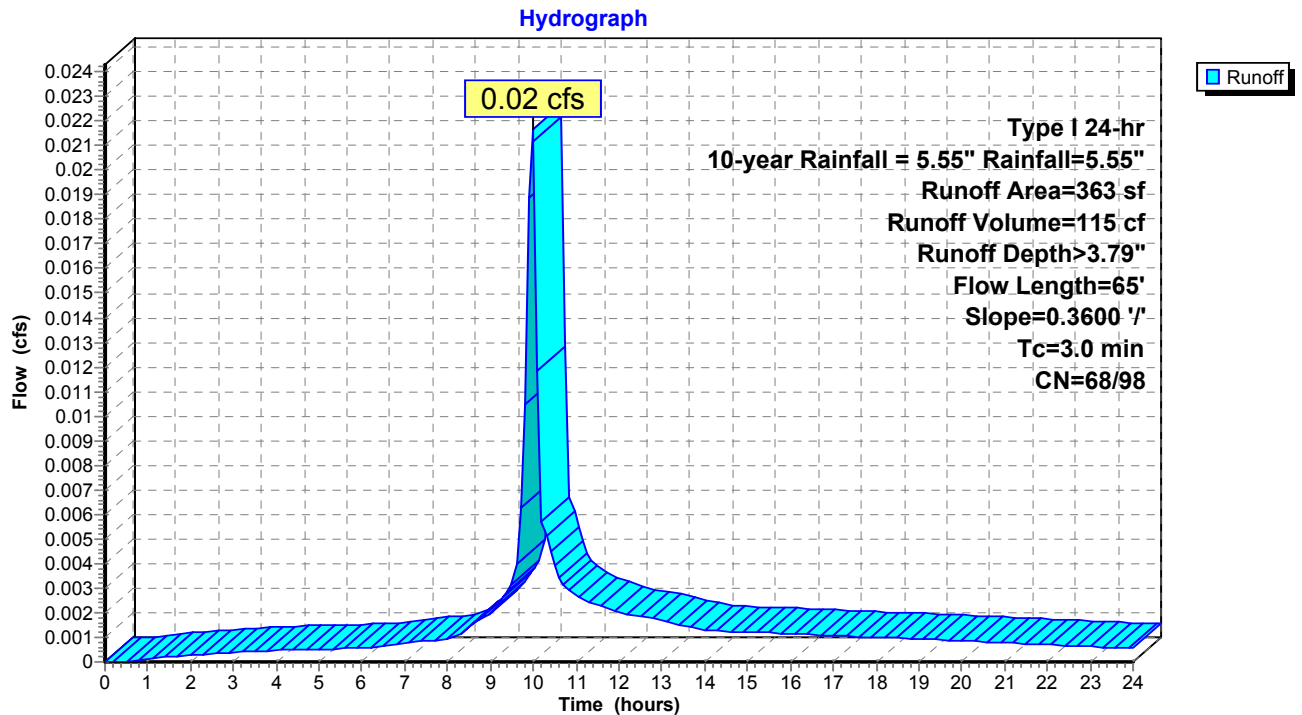
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 115 cf, Depth> 3.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
182	68	<50% Grass cover, Poor, HSG A
181	98	Unconnected pavement, HSG A
363	83	Weighted Average
182	68	50.14% Pervious Area
181	98	49.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	65	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-12: Upper East Side Yard



Summary for Subcatchment SC-14: Residence Roof, South Part, With Planters

[49] Hint: $T_c < 2dt$ may require smaller dt

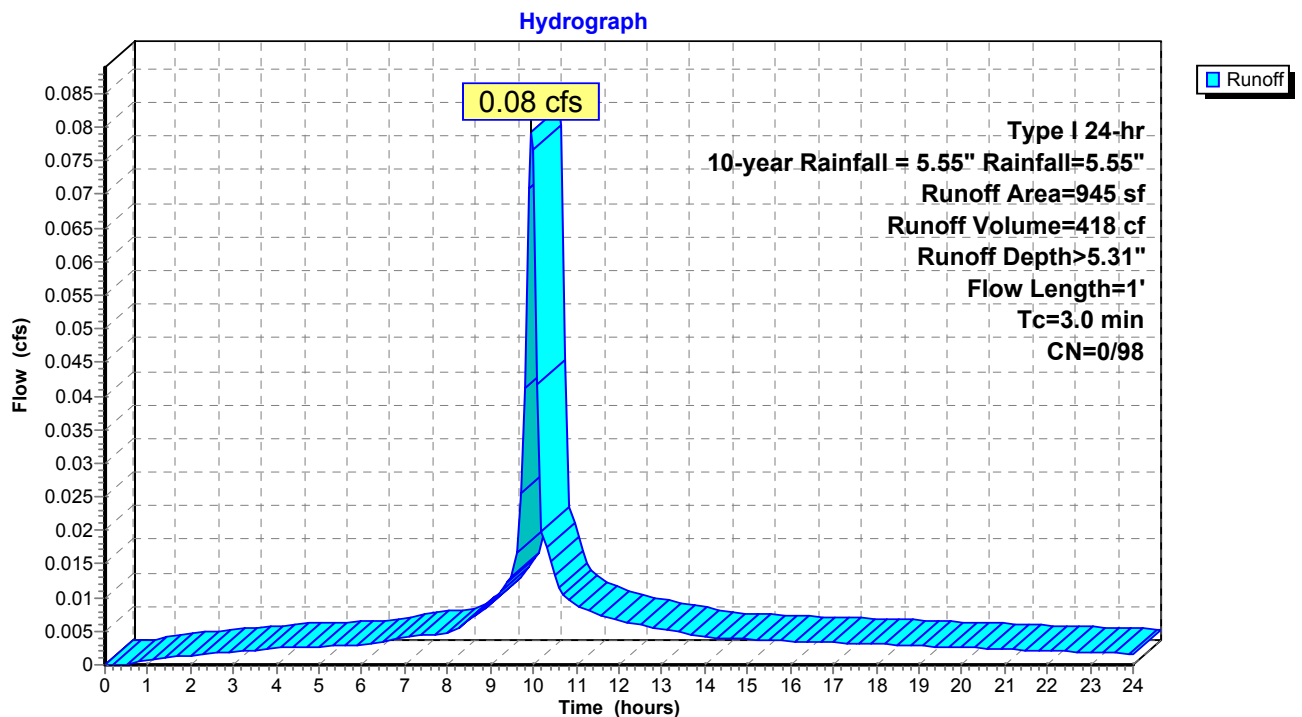
Runoff = 0.08 cfs @ 9.96 hrs, Volume= 418 cf, Depth> 5.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
945	98	Roofs, HSG A
945	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1				Total, Increased to minimum $T_c = 3.0$ min

Subcatchment SC-14: Residence Roof, South Part, With Planters



Summary for Subcatchment SC-15: Lower Level Patio

[49] Hint: $T_c < 2dt$ may require smaller dt

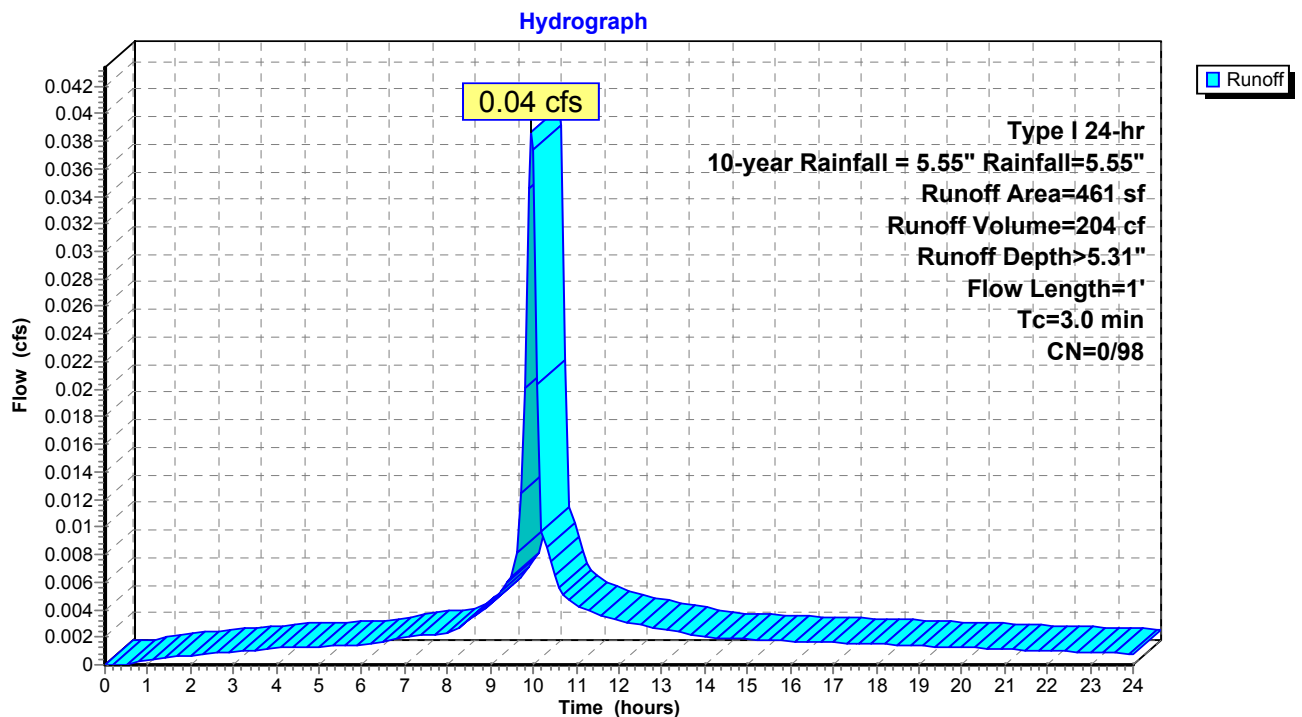
Runoff = 0.04 cfs @ 9.96 hrs, Volume= 204 cf, Depth> 5.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
461	98	Unconnected pavement, HSG A
461	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-15: Lower Level Patio



catchment SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West

[49] Hint: Tc<2dt may require smaller dt

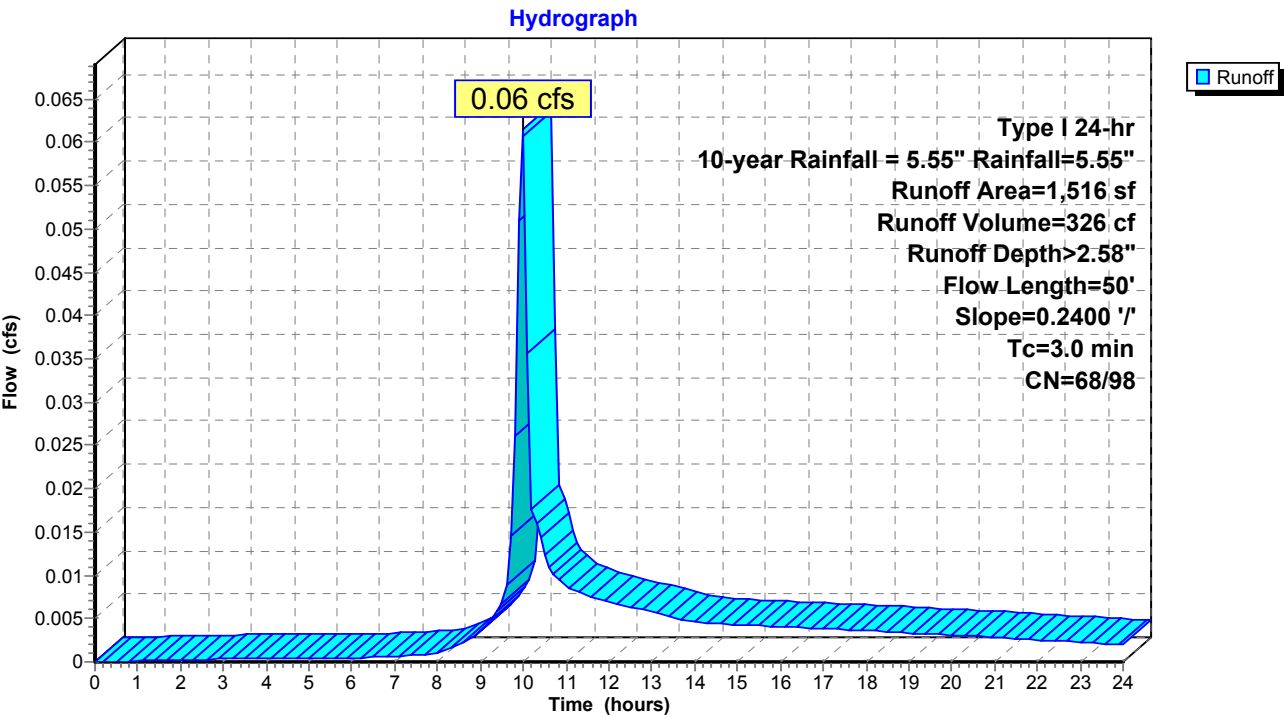
Runoff = 0.06 cfs @ 9.98 hrs, Volume= 326 cf, Depth> 2.58"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
1,365	68	<50% Grass cover, Poor, HSG A
151	98	Unconnected pavement, HSG A
1,516	71	Weighted Average
1,365	68	90.04% Pervious Area
151	98	9.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum Tc = 3.0 min			

ent SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West and E



Summary for Subcatchment SC-18: Lemonade berry mitigation area

[49] Hint: $T_c < 2dt$ may require smaller dt

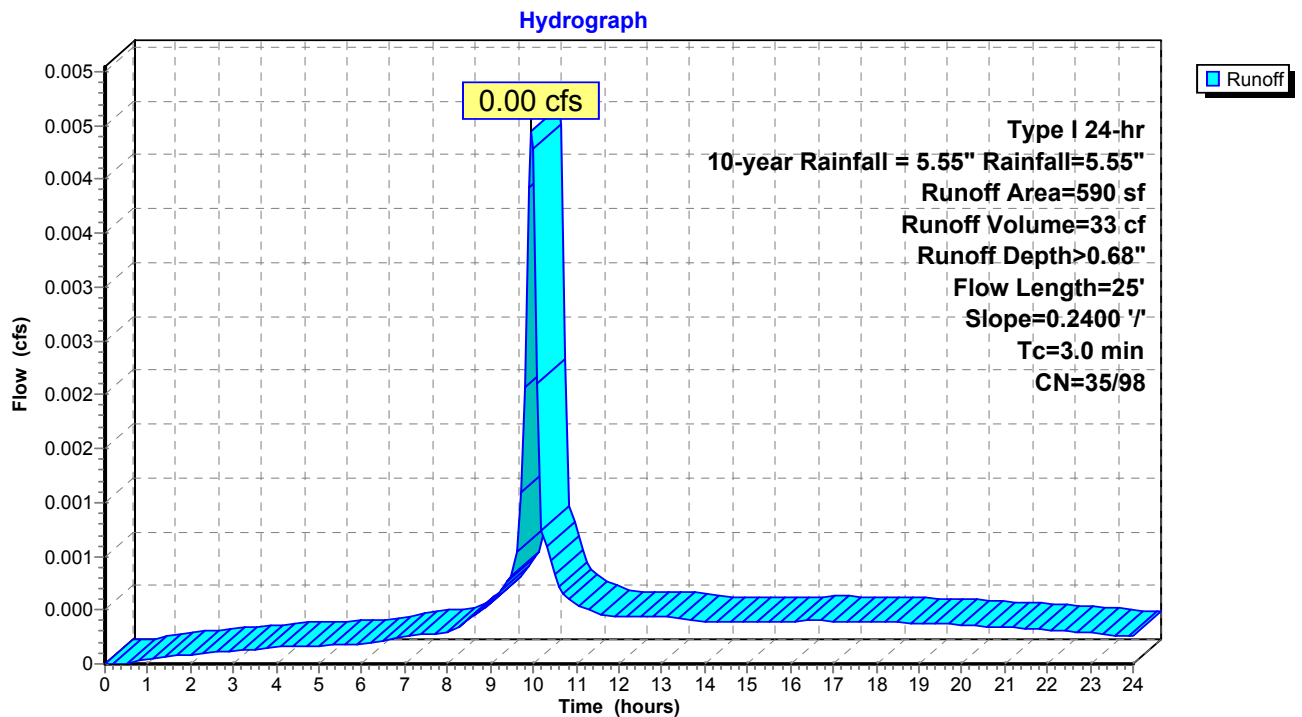
Runoff = 0.00 cfs @ 9.96 hrs, Volume= 33 cf, Depth> 0.68"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
531	35	Brush, Fair, HSG A
59	98	Unconnected pavement, HSG A
590	41	Weighted Average
531	35	90.00% Pervious Area
59	98	10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-18: Lemonade berry mitigation area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

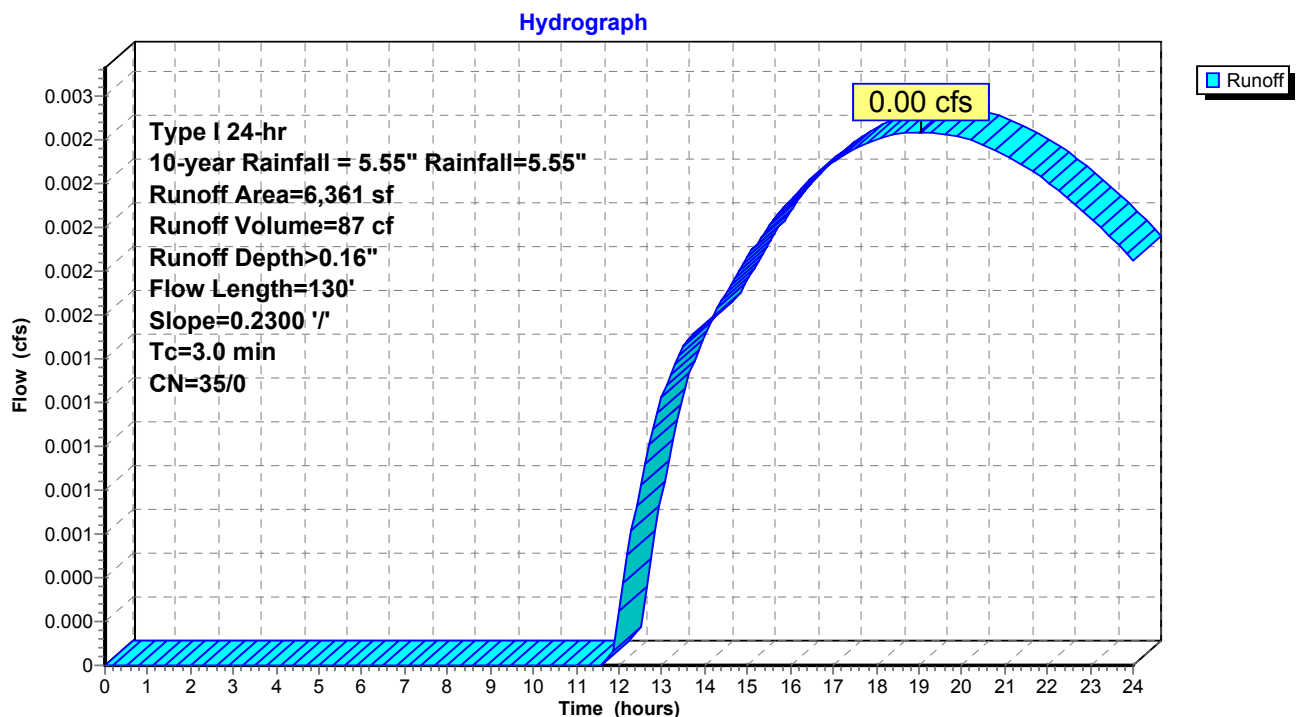
Runoff = 0.00 cfs @ 19.06 hrs, Volume= 87 cf, Depth> 0.16"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

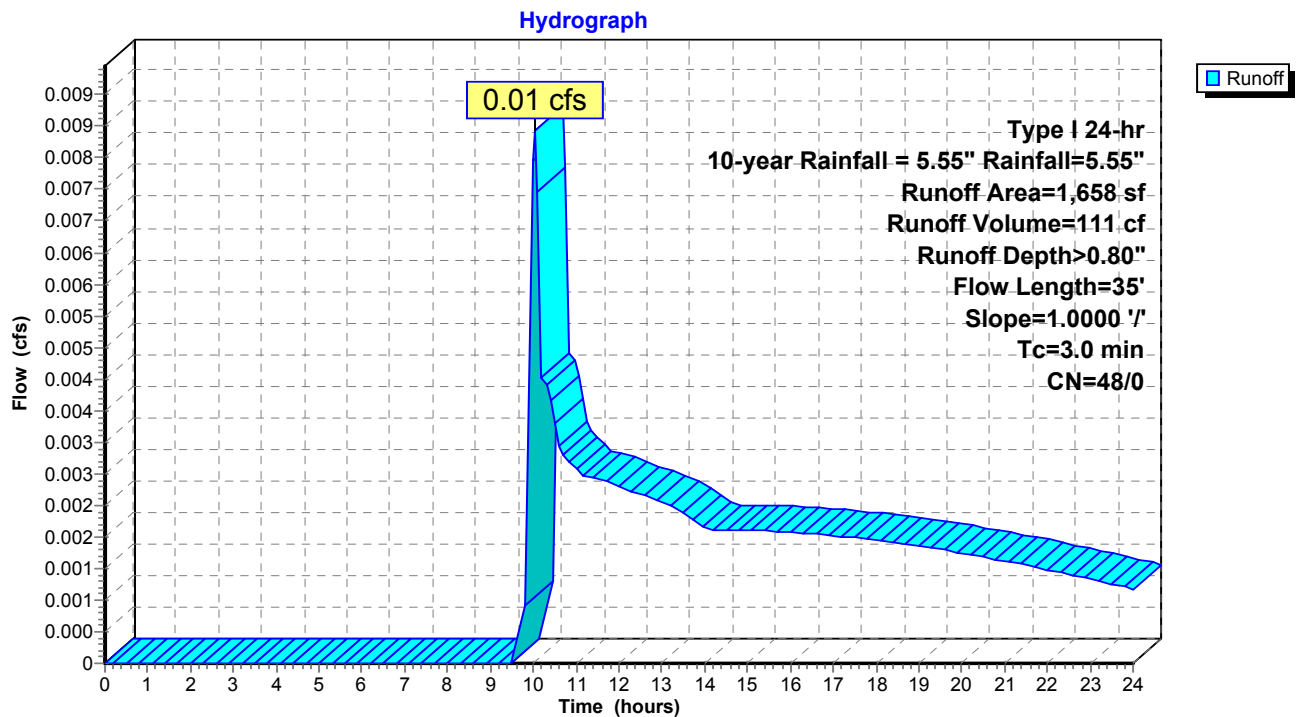
Runoff = 0.01 cfs @ 10.04 hrs, Volume= 111 cf, Depth> 0.80"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

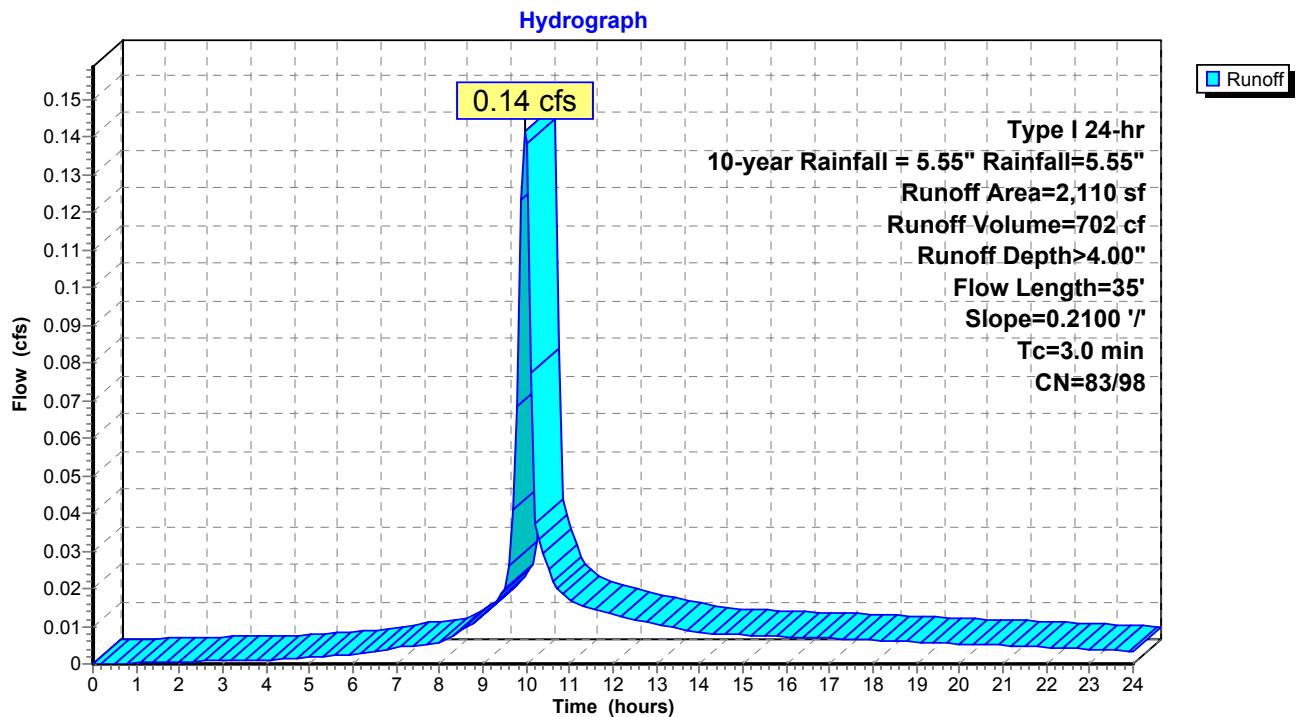
Runoff = 0.14 cfs @ 9.97 hrs, Volume= 702 cf, Depth> 4.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.7	35	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-21: Beach area



Summary for Pond 11P: Catch Basin

[57] Hint: Peaked at 95.61' (Flood elevation advised)

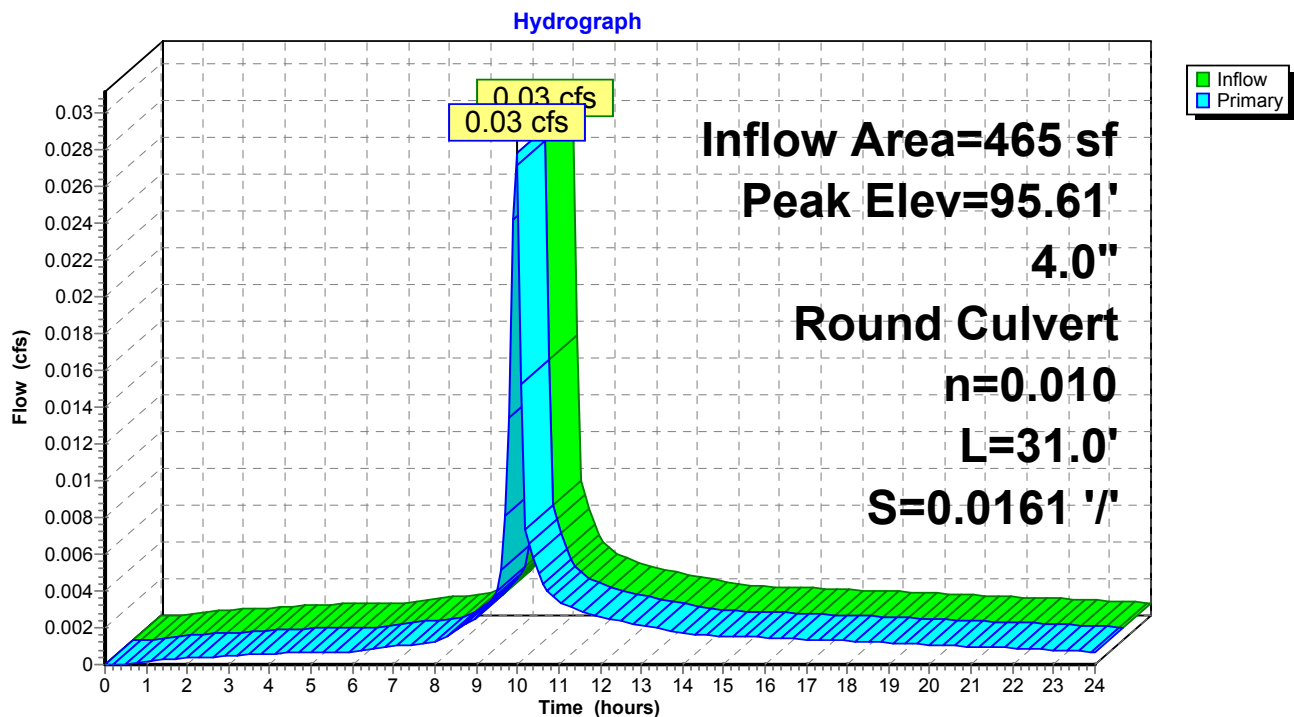
Inflow Area = 465 sf, 50.11% Impervious, Inflow Depth > 3.80" for 10-year Rainfall = 5.55" event
 Inflow = 0.03 cfs @ 9.97 hrs, Volume= 147 cf
 Outflow = 0.03 cfs @ 9.97 hrs, Volume= 147 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.03 cfs @ 9.97 hrs, Volume= 147 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.61' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0161 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.03 cfs @ 9.97 hrs HW=95.61' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.03 cfs @ 1.11 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Catch Basin

[57] Hint: Peaked at 95.60' (Flood elevation advised)

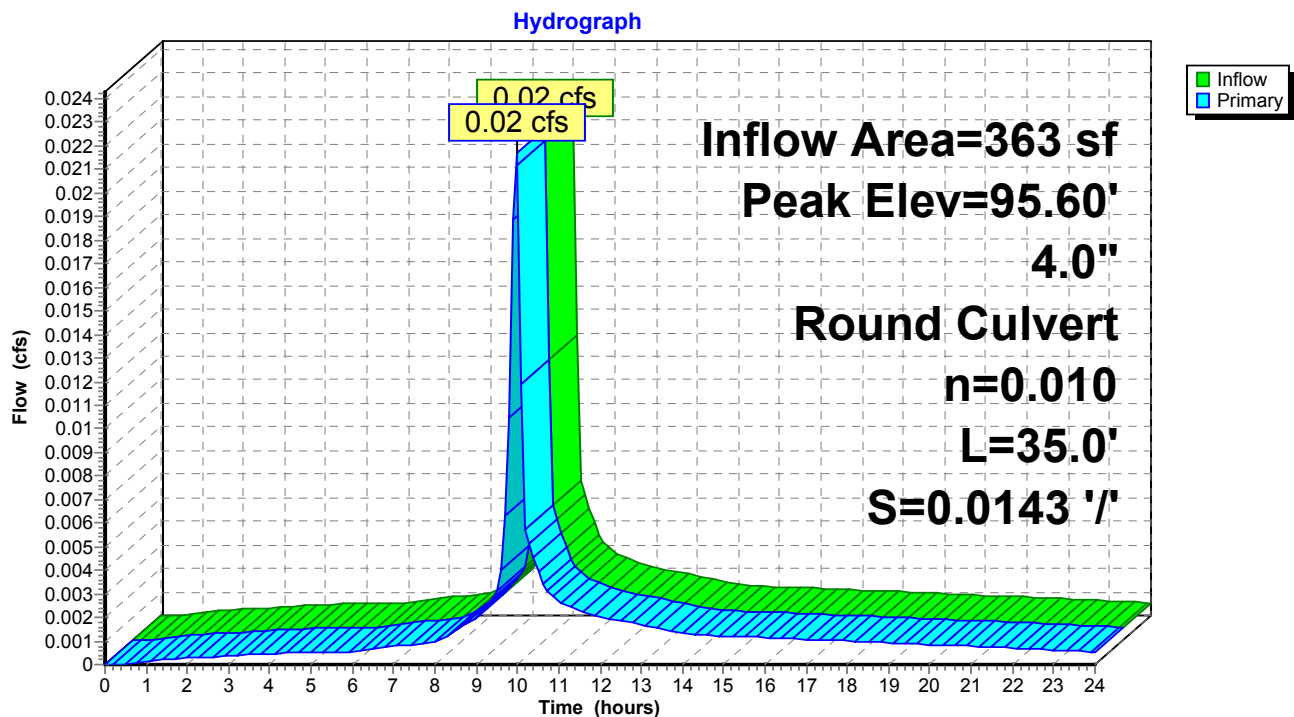
Inflow Area = 363 sf, 49.86% Impervious, Inflow Depth > 3.79" for 10-year Rainfall = 5.55" event
 Inflow = 0.02 cfs @ 9.97 hrs, Volume= 115 cf
 Outflow = 0.02 cfs @ 9.97 hrs, Volume= 115 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.97 hrs, Volume= 115 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.60' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0143 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.97 hrs HW=95.59' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.02 cfs @ 1.04 fps)

Pond 12P: Catch Basin



Summary for Pond 14P: Catch Basin

[57] Hint: Peaked at 96.19' (Flood elevation advised)

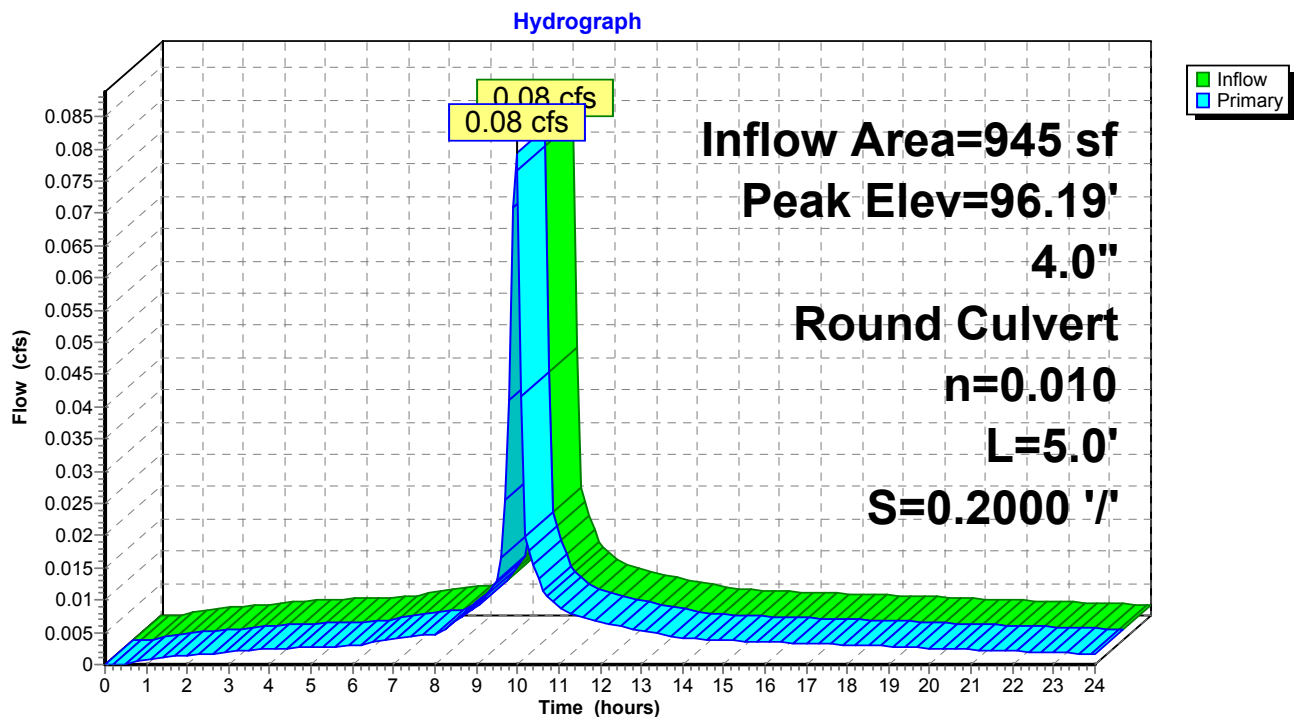
Inflow Area = 945 sf, 100.00% Impervious, Inflow Depth > 5.31" for 10-year Rainfall = 5.55" event
 Inflow = 0.08 cfs @ 9.96 hrs, Volume= 418 cf
 Outflow = 0.08 cfs @ 9.96 hrs, Volume= 418 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.08 cfs @ 9.96 hrs, Volume= 418 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 96.19' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	96.00'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.00' / 95.00' S= 0.2000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.07 cfs @ 9.96 hrs HW=96.19' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.07 cfs @ 1.47 fps)

Pond 14P: Catch Basin



Summary for Pond 15P: Catch Basin

[57] Hint: Peaked at 95.63' (Flood elevation advised)

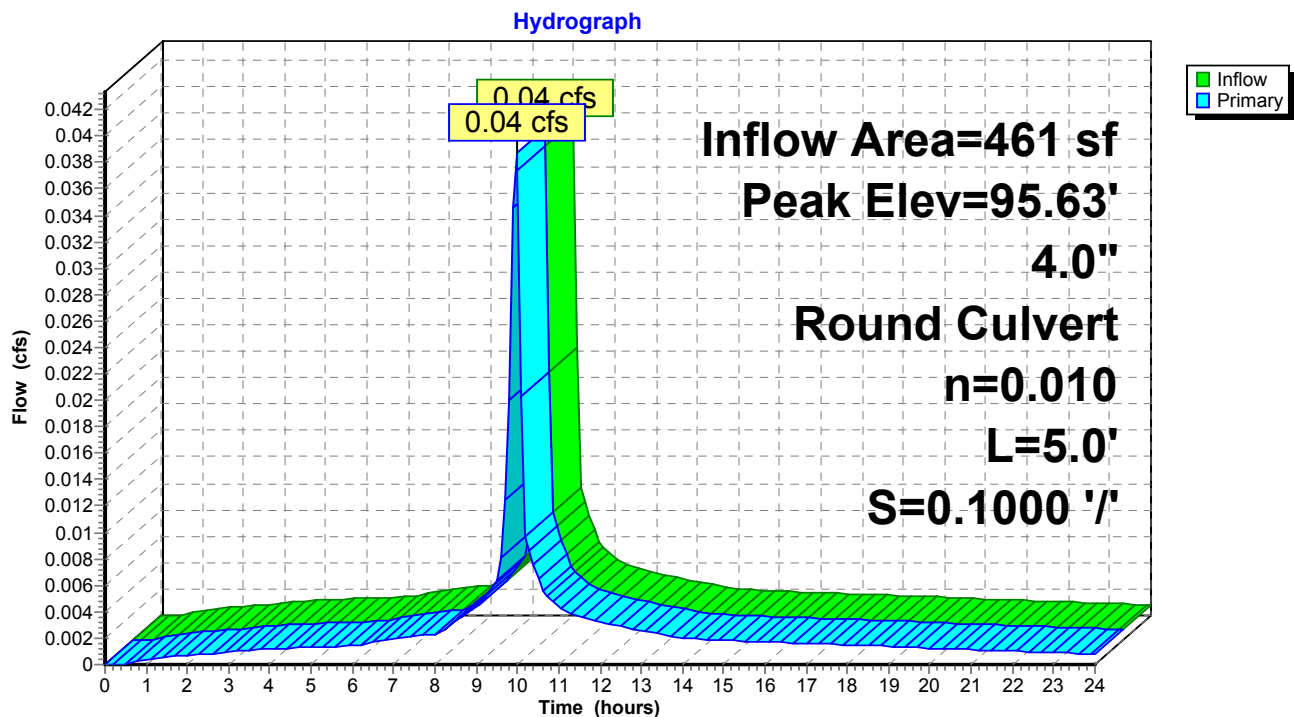
Inflow Area = 461 sf, 100.00% Impervious, Inflow Depth > 5.31" for 10-year Rainfall = 5.55" event
 Inflow = 0.04 cfs @ 9.96 hrs, Volume= 204 cf
 Outflow = 0.04 cfs @ 9.96 hrs, Volume= 204 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 9.96 hrs, Volume= 204 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.63' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.04 cfs @ 9.96 hrs HW=95.63' (Free Discharge)
 1=Culvert (Inlet Controls 0.04 cfs @ 1.21 fps)

Pond 15P: Catch Basin



Summary for Pond WST-3: Water Storage Tank - 3

Inflow Area = 2,234 sf, 81.47% Impervious, Inflow Depth > 9.41" for 10-year Rainfall = 5.55" event
 Inflow = 0.18 cfs @ 9.97 hrs, Volume= 1,751 cf, Incl. 0.01 cfs Base Flow
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 93.83' @ 24.00 hrs Surf.Area= 256 sf Storage= 1,749 cf

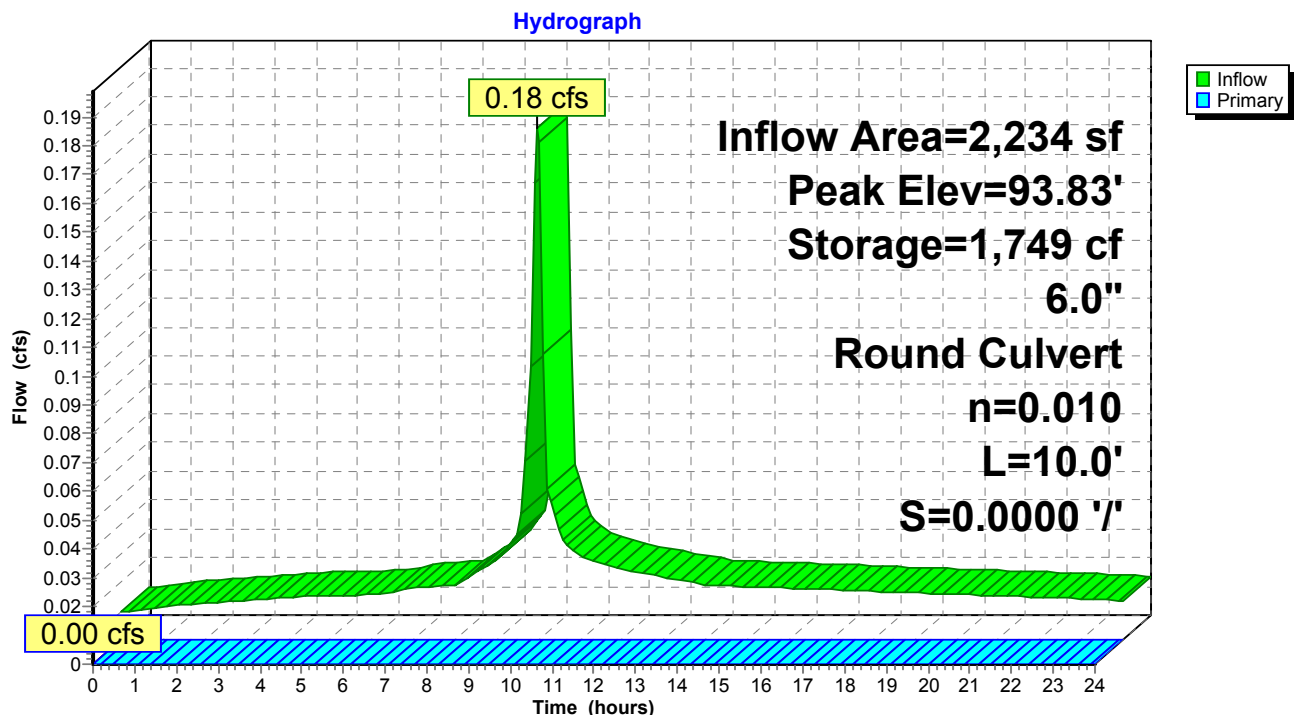
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	87.00'	2,048 cf	96.0" W x 96.0" H Box Pipe Storage L= 32.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	95.00'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.00' / 95.00' S= 0.0000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=87.01' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-3: Water Storage Tank - 3



Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SC-11: Upper West Side Yard Runoff Area=465 sf 50.11% Impervious Runoff Depth>4.82"
Flow Length=78' Slope=0.4300 '/' Tc=3.0 min CN=68/98 Runoff=0.04 cfs 187 cf

Subcatchment SC-12: Upper East Side Yard Runoff Area=363 sf 49.86% Impervious Runoff Depth>4.82"
Flow Length=65' Slope=0.3600 '/' Tc=3.0 min CN=68/98 Runoff=0.03 cfs 146 cf

Subcatchment SC-14: Residence Roof, Runoff Area=945 sf 100.00% Impervious Runoff Depth>6.47"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.10 cfs 509 cf

Subcatchment SC-15: Lower Level Patio Runoff Area=461 sf 100.00% Impervious Runoff Depth>6.47"
Flow Length=1' Tc=3.0 min CN=0/98 Runoff=0.05 cfs 248 cf

Subcatchment SC-17: Restored Temporary Runoff Area=1,516 sf 9.96% Impervious Runoff Depth>3.50"
Flow Length=50' Slope=0.2400 '/' Tc=3.0 min CN=68/98 Runoff=0.09 cfs 442 cf

Subcatchment SC-18: Lemonade berry Runoff Area=590 sf 10.00% Impervious Runoff Depth>1.02"
Flow Length=25' Slope=0.2400 '/' Tc=3.0 min CN=35/98 Runoff=0.01 cfs 50 cf

Subcatchment SC-19: Contiguous lemonade Runoff Area=6,361 sf 0.00% Impervious Runoff Depth>0.41"
Flow Length=130' Slope=0.2300 '/' Tc=3.0 min CN=35/0 Runoff=0.01 cfs 220 cf

Subcatchment SC-20: Coastal bluff Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>1.34"
Flow Length=35' Slope=1.0000 '/' Tc=3.0 min CN=48/0 Runoff=0.02 cfs 185 cf

Subcatchment SC-21: Beach area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>5.09"
Flow Length=35' Slope=0.2100 '/' Tc=3.0 min CN=83/98 Runoff=0.18 cfs 895 cf

Pond 11P: Catch Basin Peak Elev=95.62' Inflow=0.04 cfs 187 cf
4.0" Round Culvert n=0.010 L=31.0' S=0.0161 '/' Outflow=0.04 cfs 187 cf

Pond 12P: Catch Basin Peak Elev=95.61' Inflow=0.03 cfs 146 cf
4.0" Round Culvert n=0.010 L=35.0' S=0.0143 '/' Outflow=0.03 cfs 146 cf

Pond 14P: Catch Basin Peak Elev=96.22' Inflow=0.10 cfs 509 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.2000 '/' Outflow=0.10 cfs 509 cf

Pond 15P: Catch Basin Peak Elev=95.64' Inflow=0.05 cfs 248 cf
4.0" Round Culvert n=0.010 L=5.0' S=0.1000 '/' Outflow=0.05 cfs 248 cf

Pond WST-3: Water Storage Tank - 3 Peak Elev=94.64' Storage=1,955 cf Inflow=0.22 cfs 1,958 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.00 cfs 0 cf

Total Runoff Area = 14,469 sf Runoff Volume = 2,883 cf Average Runoff Depth = 2.39"
83.09% Pervious = 12,023 sf 16.91% Impervious = 2,446 sf

Summary for Subcatchment SC-11: Upper West Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

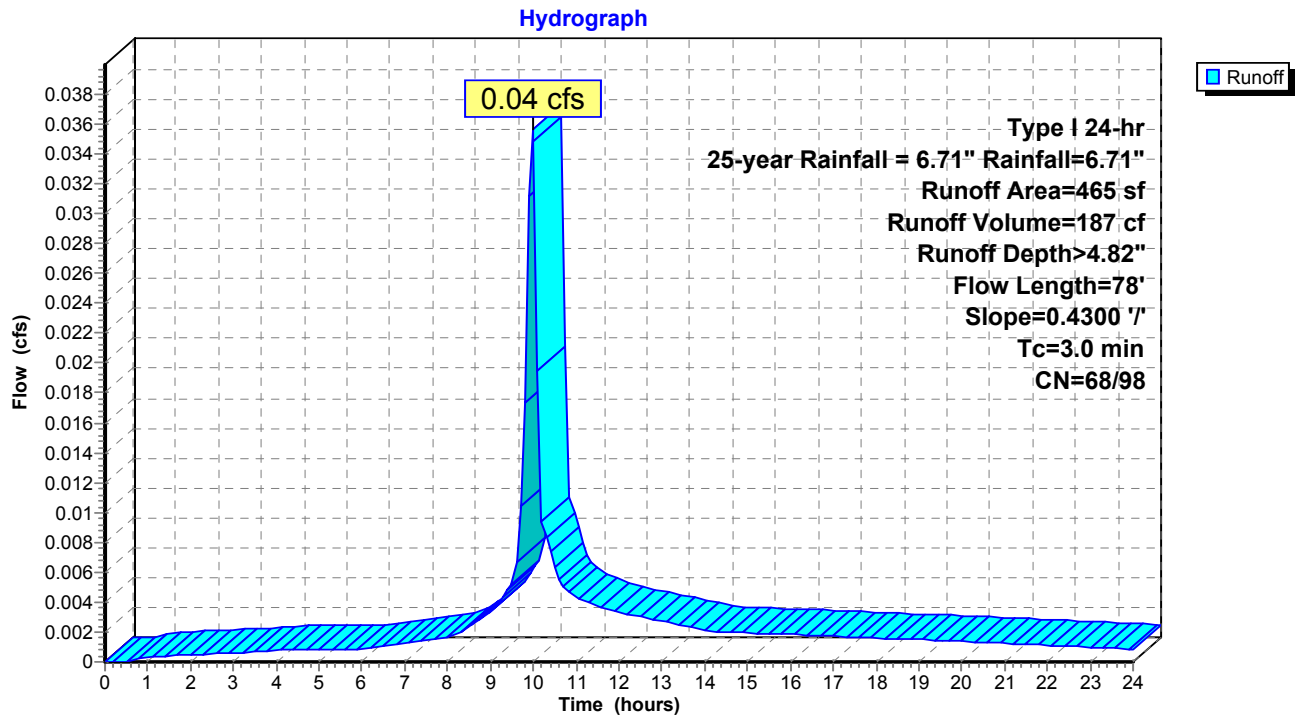
Runoff = 0.04 cfs @ 9.97 hrs, Volume= 187 cf, Depth> 4.82"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
232	68	<50% Grass cover, Poor, HSG A
233	98	Unconnected pavement, HSG A
465	83	Weighted Average
232	68	49.89% Pervious Area
233	98	50.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	78	0.4300	1.33		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.0	78	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-11: Upper West Side Yard



Summary for Subcatchment SC-12: Upper East Side Yard

[49] Hint: $T_c < 2dt$ may require smaller dt

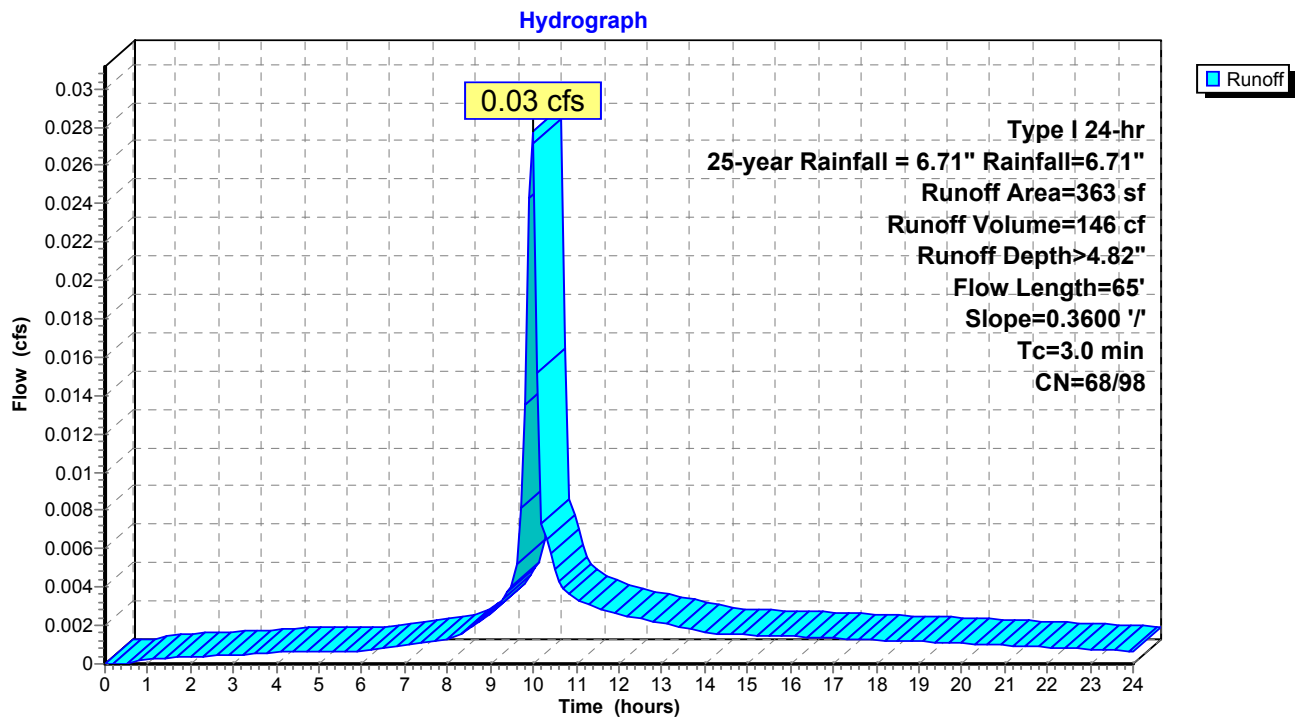
Runoff = 0.03 cfs @ 9.97 hrs, Volume= 146 cf, Depth> 4.82"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
182	68	<50% Grass cover, Poor, HSG A
181	98	Unconnected pavement, HSG A
363	83	Weighted Average
182	68	50.14% Pervious Area
181	98	49.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	65	0.3600	1.19		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.9	65	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-12: Upper East Side Yard



Summary for Subcatchment SC-14: Residence Roof, South Part, With Planters

[49] Hint: $T_c < 2dt$ may require smaller dt

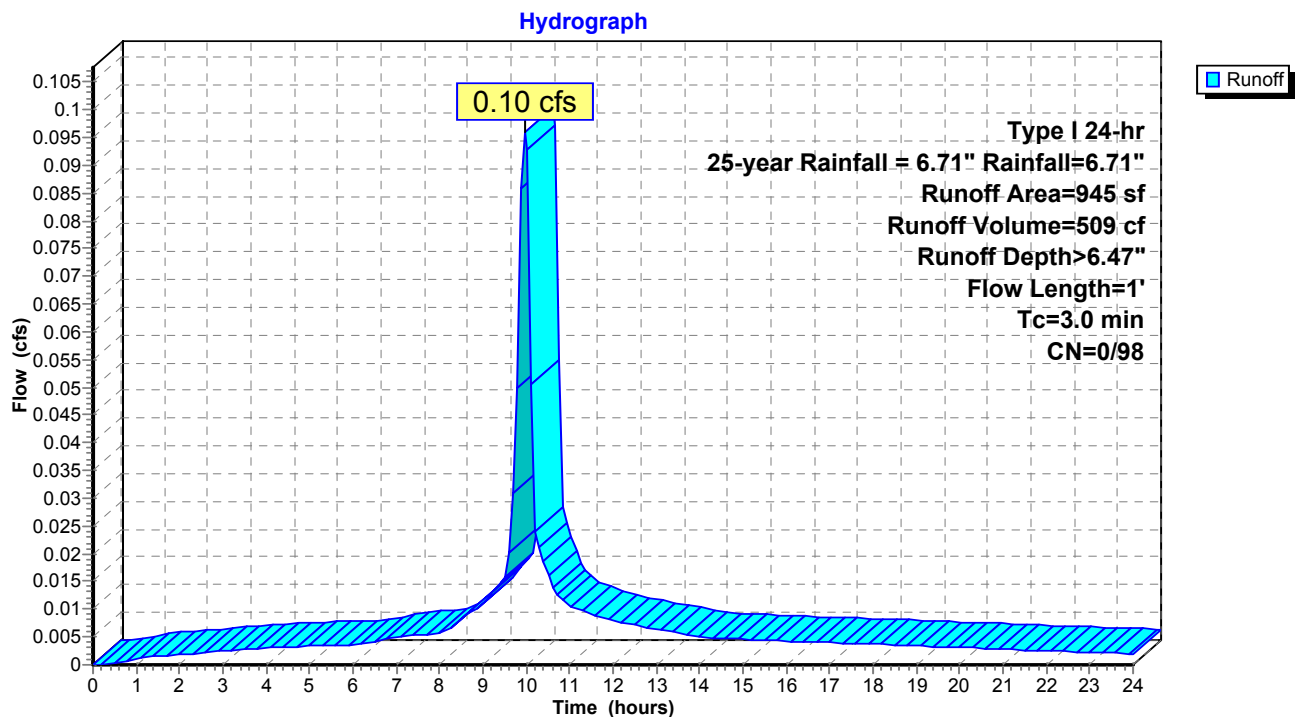
Runoff = 0.10 cfs @ 9.96 hrs, Volume= 509 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
945	98	Roofs, HSG A
945	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-14: Residence Roof, South Part, With Planters



Summary for Subcatchment SC-15: Lower Level Patio

[49] Hint: $T_c < 2dt$ may require smaller dt

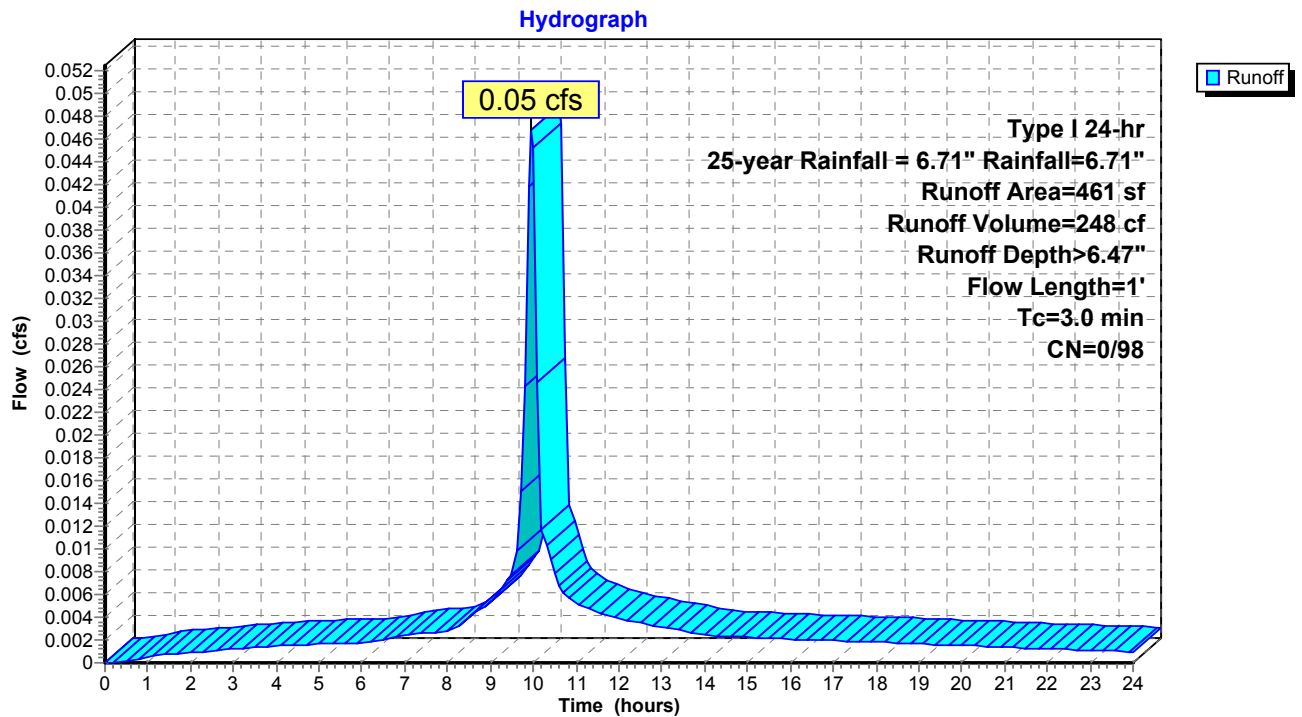
Runoff = 0.05 cfs @ 9.96 hrs, Volume= 248 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
461	98	Unconnected pavement, HSG A
461	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	1		0.02		Direct Entry,
1.0	1	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-15: Lower Level Patio



catchment SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West

[49] Hint: $T_c < 2dt$ may require smaller dt

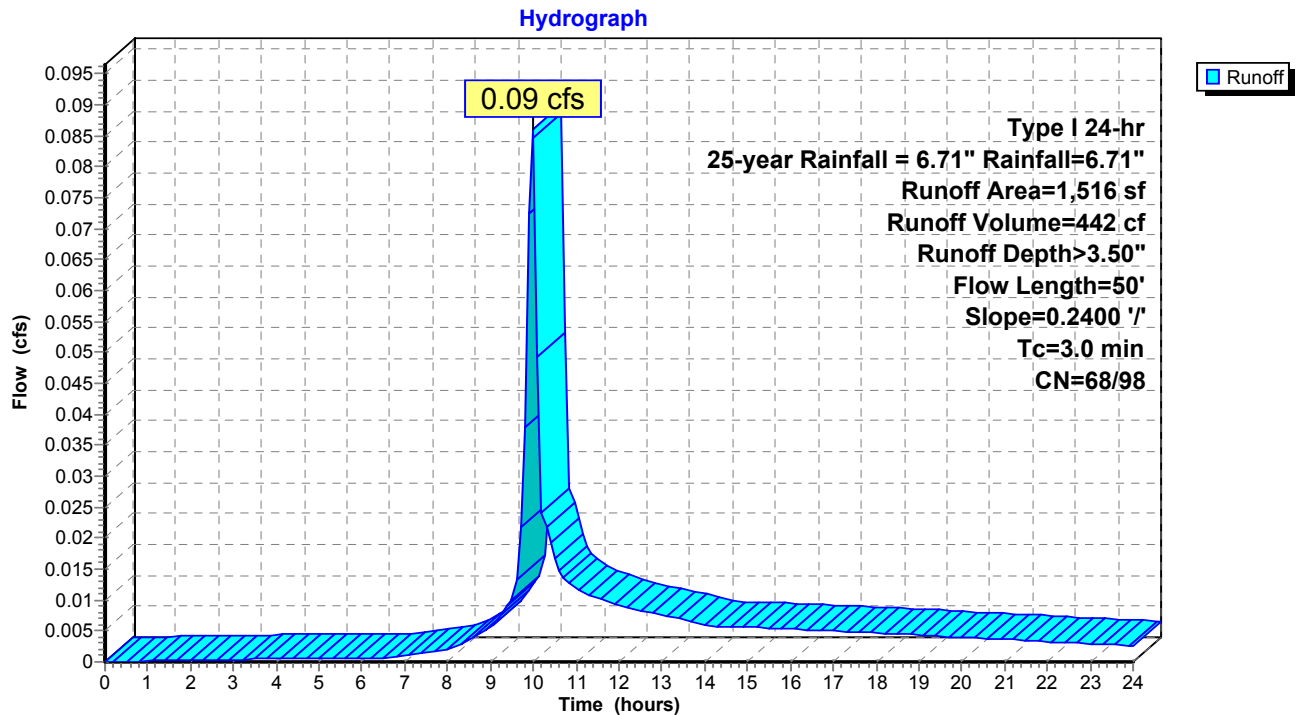
Runoff = 0.09 cfs @ 9.98 hrs, Volume= 442 cf, Depth> 3.50"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,365	68	<50% Grass cover, Poor, HSG A
151	98	Unconnected pavement, HSG A
1,516	71	Weighted Average
1,365	68	90.04% Pervious Area
151	98	9.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2400	0.96		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.9	50	Total, Increased to minimum Tc = 3.0 min			

ent SC-17: Restored Temporary Construction Bench/Lower Private Open Space and Lower West and E



Summary for Subcatchment SC-18: Lemonade berry mitigation area

[49] Hint: $T_c < 2dt$ may require smaller dt

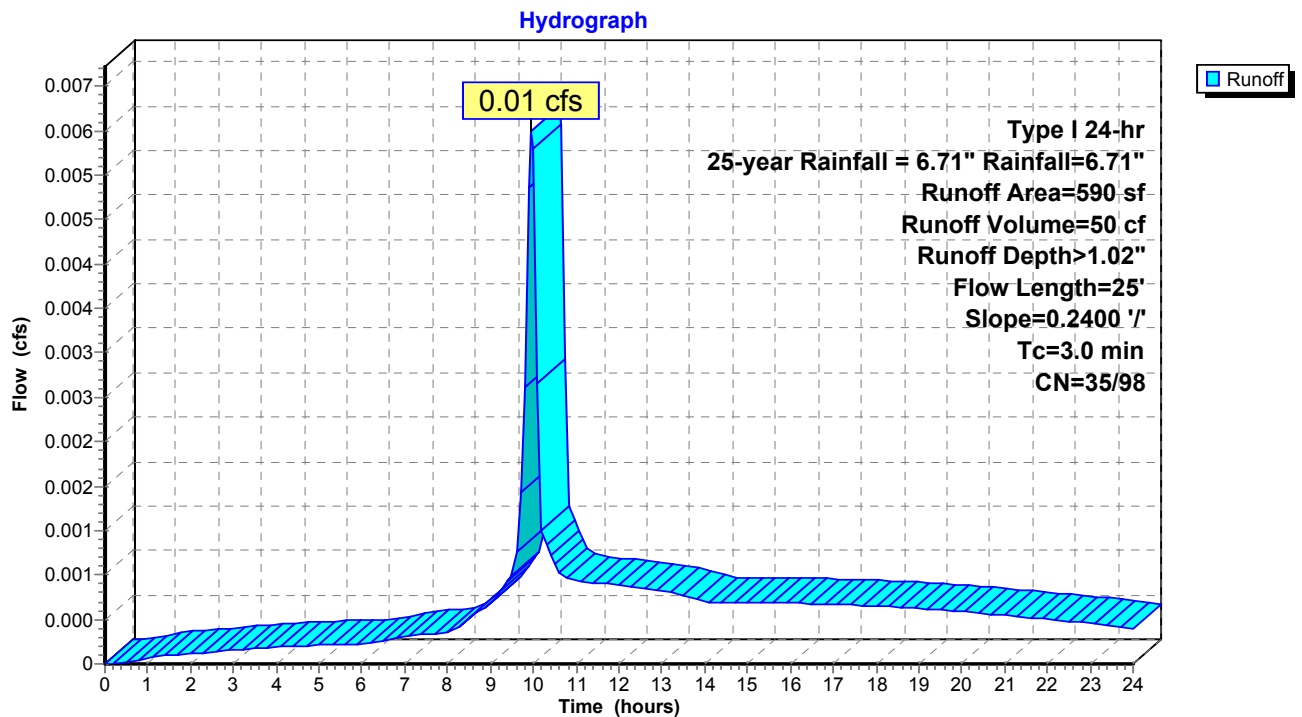
Runoff = 0.01 cfs @ 9.96 hrs, Volume= 50 cf, Depth> 1.02"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
531	35	Brush, Fair, HSG A
59	98	Unconnected pavement, HSG A
590	41	Weighted Average
531	35	90.00% Pervious Area
59	98	10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.2400	0.84		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.5	25	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-18: Lemonade berry mitigation area



Summary for Subcatchment SC-19: Contiguous lemonade berry

[49] Hint: $T_c < 2dt$ may require smaller dt

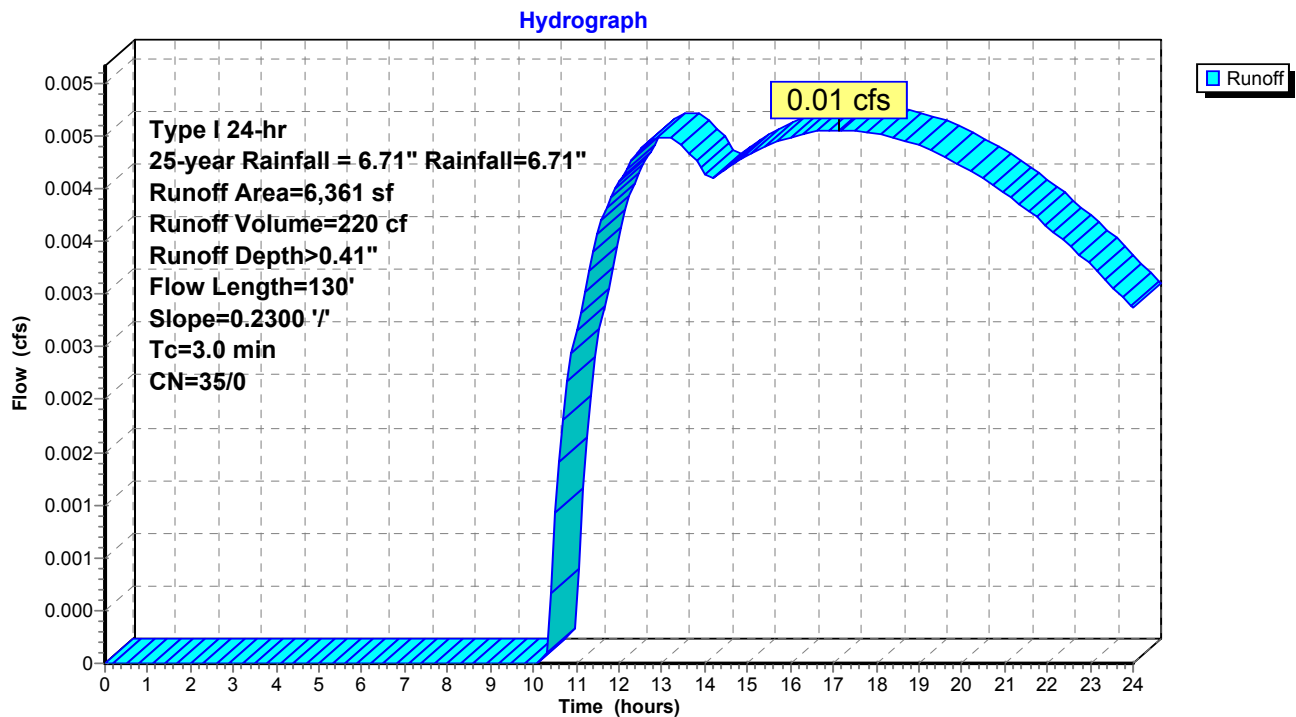
Runoff = 0.01 cfs @ 17.16 hrs, Volume= 220 cf, Depth> 0.41"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
6,361	35	Brush, Fair, HSG A
6,361	35	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	130	0.2300	1.15		Sheet Flow, Fallow n= 0.050 P2= 3.20"
1.9	130	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-19: Contiguous lemonade berry



Summary for Subcatchment SC-20: Coastal bluff

[49] Hint: $T_c < 2dt$ may require smaller dt

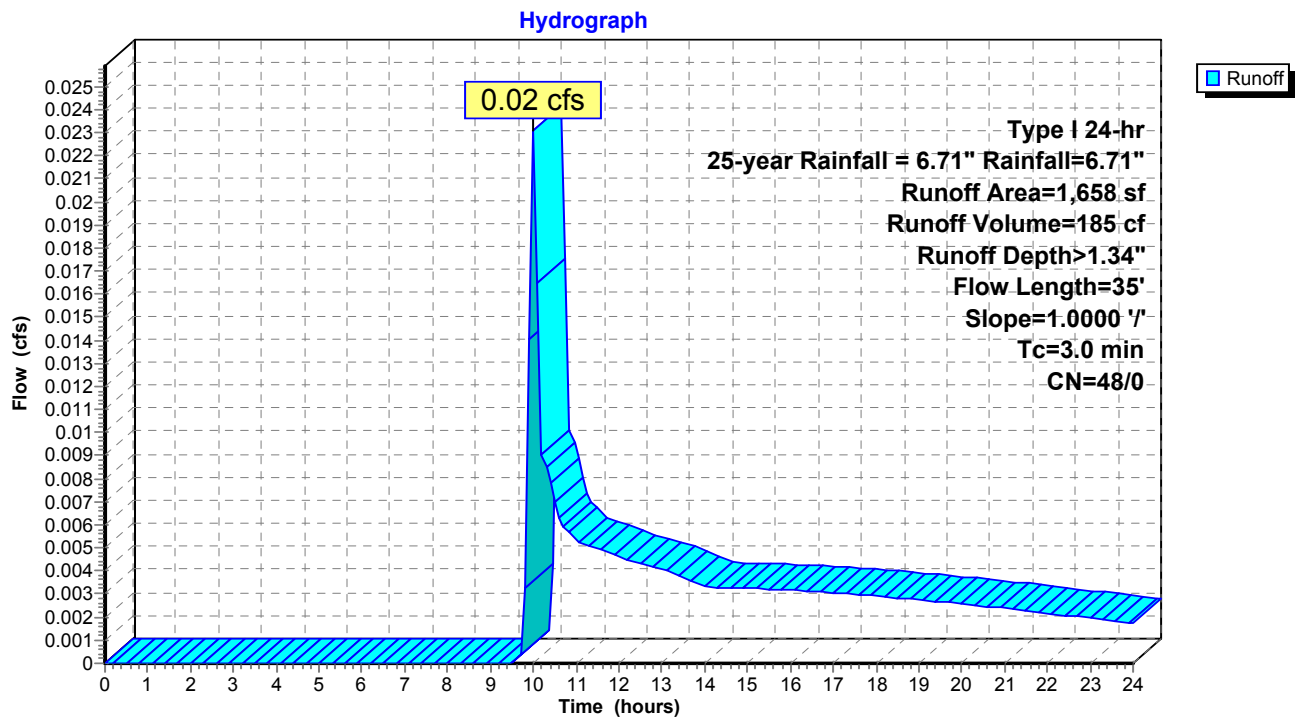
Runoff = 0.02 cfs @ 10.01 hrs, Volume= 185 cf, Depth> 1.34"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	35	1.0000	1.59		Sheet Flow, Fallow n= 0.050 P2= 3.20"
0.4	35	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-20: Coastal bluff



Summary for Subcatchment SC-21: Beach area

[49] Hint: $T_c < 2dt$ may require smaller dt

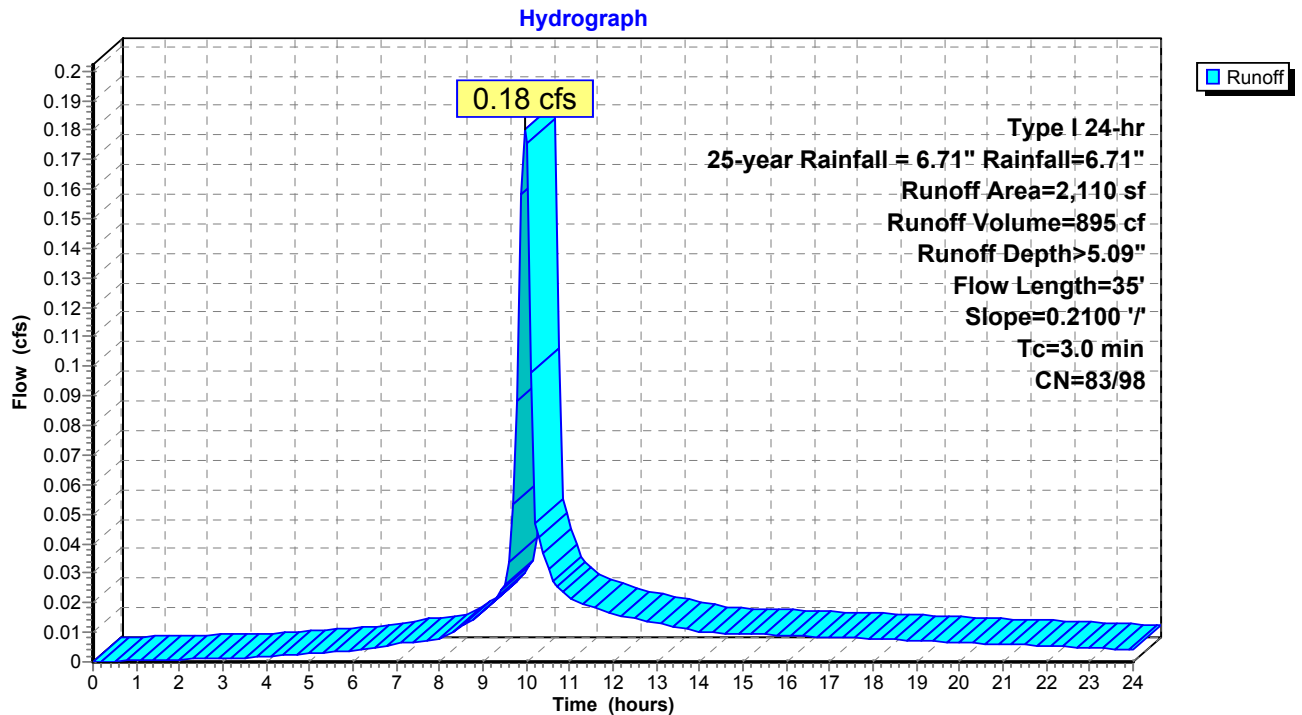
Runoff = 0.18 cfs @ 9.97 hrs, Volume= 895 cf, Depth> 5.09"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,694	83	Brush, Poor, HSG D
416	98	Unconnected pavement, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.2100	0.85		Sheet Flow, Fallow $n= 0.050$ $P2= 3.20"$
0.7	35	Total, Increased to minimum $T_c = 3.0$ min			

Subcatchment SC-21: Beach area



Summary for Pond 11P: Catch Basin

[57] Hint: Peaked at 95.62' (Flood elevation advised)

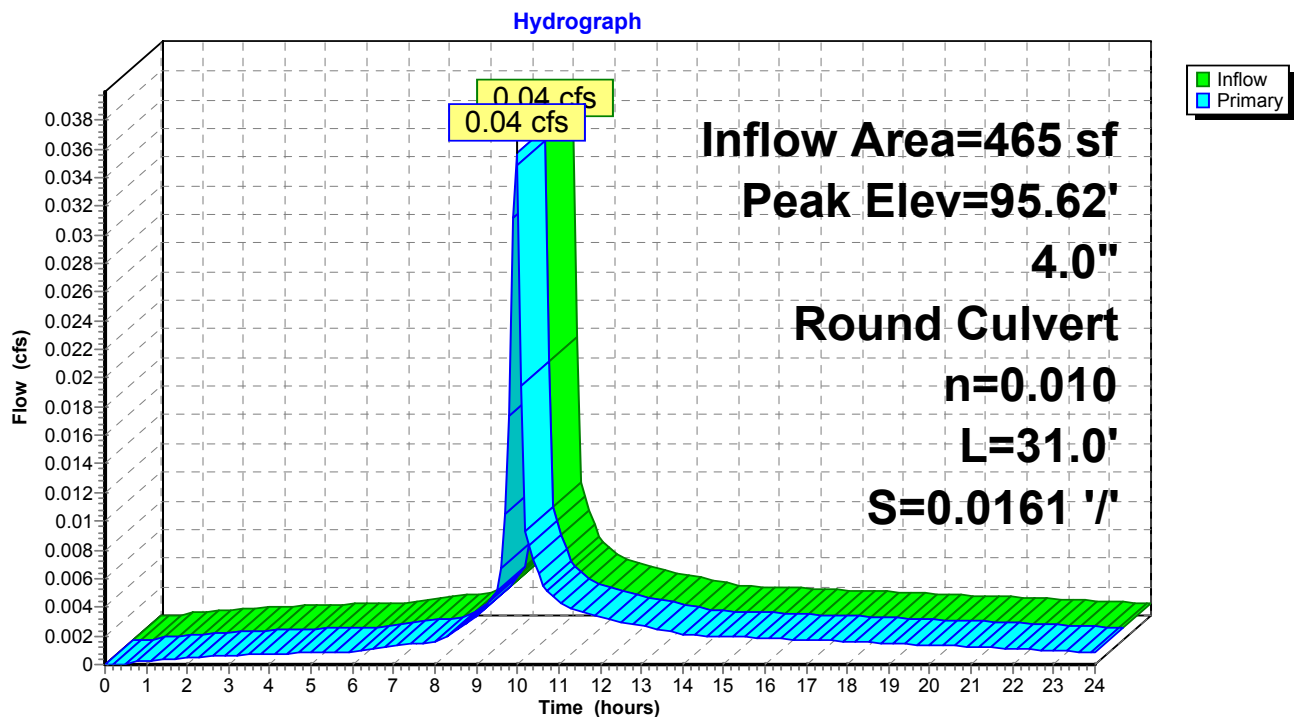
Inflow Area = 465 sf, 50.11% Impervious, Inflow Depth > 4.82" for 25-year Rainfall = 6.71" event
 Inflow = 0.04 cfs @ 9.97 hrs, Volume= 187 cf
 Outflow = 0.04 cfs @ 9.97 hrs, Volume= 187 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.04 cfs @ 9.97 hrs, Volume= 187 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.62' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0161 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.03 cfs @ 9.97 hrs HW=95.62' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.03 cfs @ 1.18 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Catch Basin

[57] Hint: Peaked at 95.61' (Flood elevation advised)

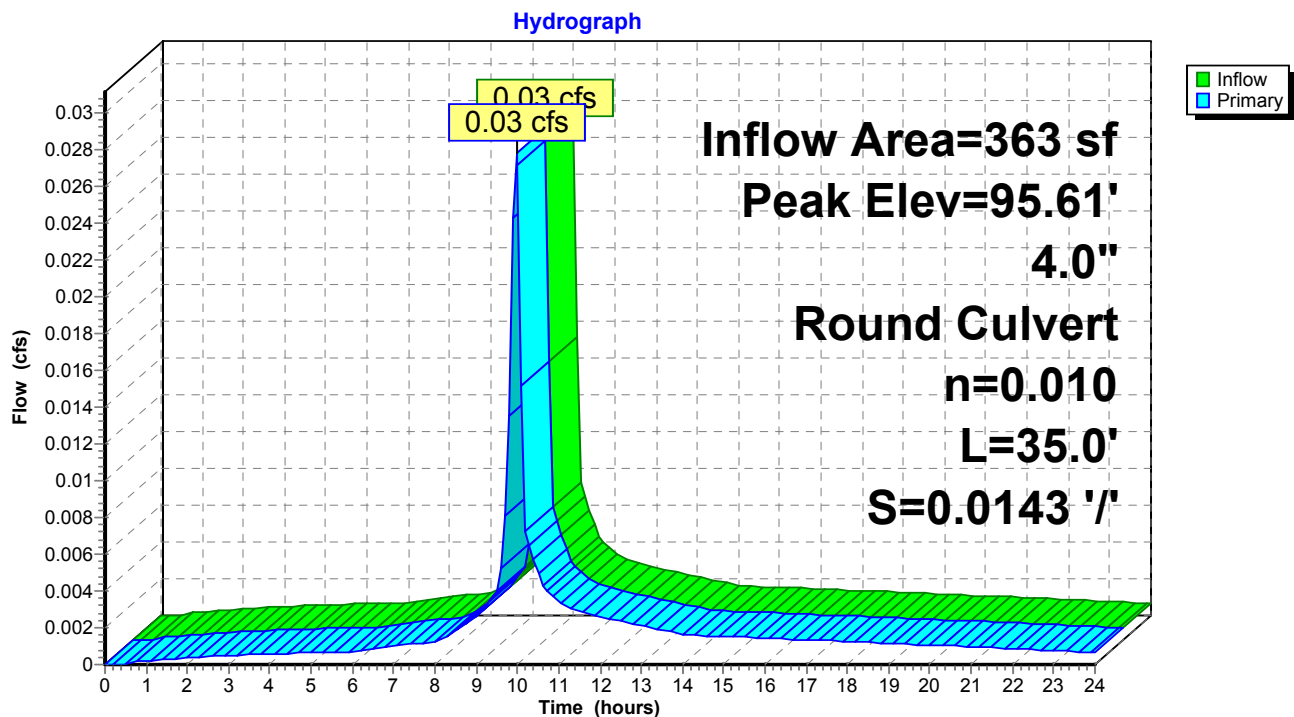
Inflow Area = 363 sf, 49.86% Impervious, Inflow Depth > 4.82" for 25-year Rainfall = 6.71" event
 Inflow = 0.03 cfs @ 9.97 hrs, Volume= 146 cf
 Outflow = 0.03 cfs @ 9.97 hrs, Volume= 146 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.03 cfs @ 9.97 hrs, Volume= 146 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.61' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 35.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.0143 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.03 cfs @ 9.97 hrs HW=95.61' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.03 cfs @ 1.11 fps)

Pond 12P: Catch Basin



Summary for Pond 14P: Catch Basin

[57] Hint: Peaked at 96.22' (Flood elevation advised)

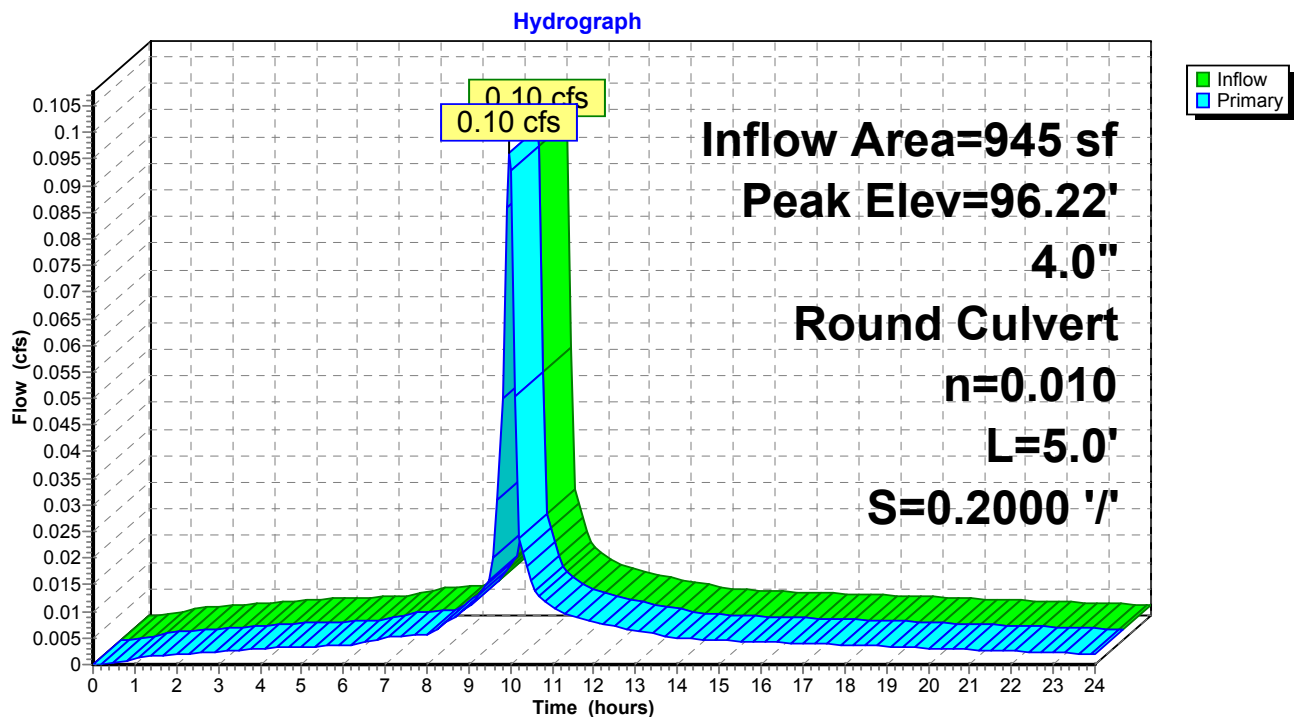
Inflow Area = 945 sf, 100.00% Impervious, Inflow Depth > 6.47" for 25-year Rainfall = 6.71" event
 Inflow = 0.10 cfs @ 9.96 hrs, Volume= 509 cf
 Outflow = 0.10 cfs @ 9.96 hrs, Volume= 509 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.10 cfs @ 9.96 hrs, Volume= 509 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 96.22' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	96.00'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.00' / 95.00' S= 0.2000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.09 cfs @ 9.96 hrs HW=96.21' (Free Discharge)
 1=Culvert (Inlet Controls 0.09 cfs @ 1.56 fps)

Pond 14P: Catch Basin



Summary for Pond 15P: Catch Basin

[57] Hint: Peaked at 95.64' (Flood elevation advised)

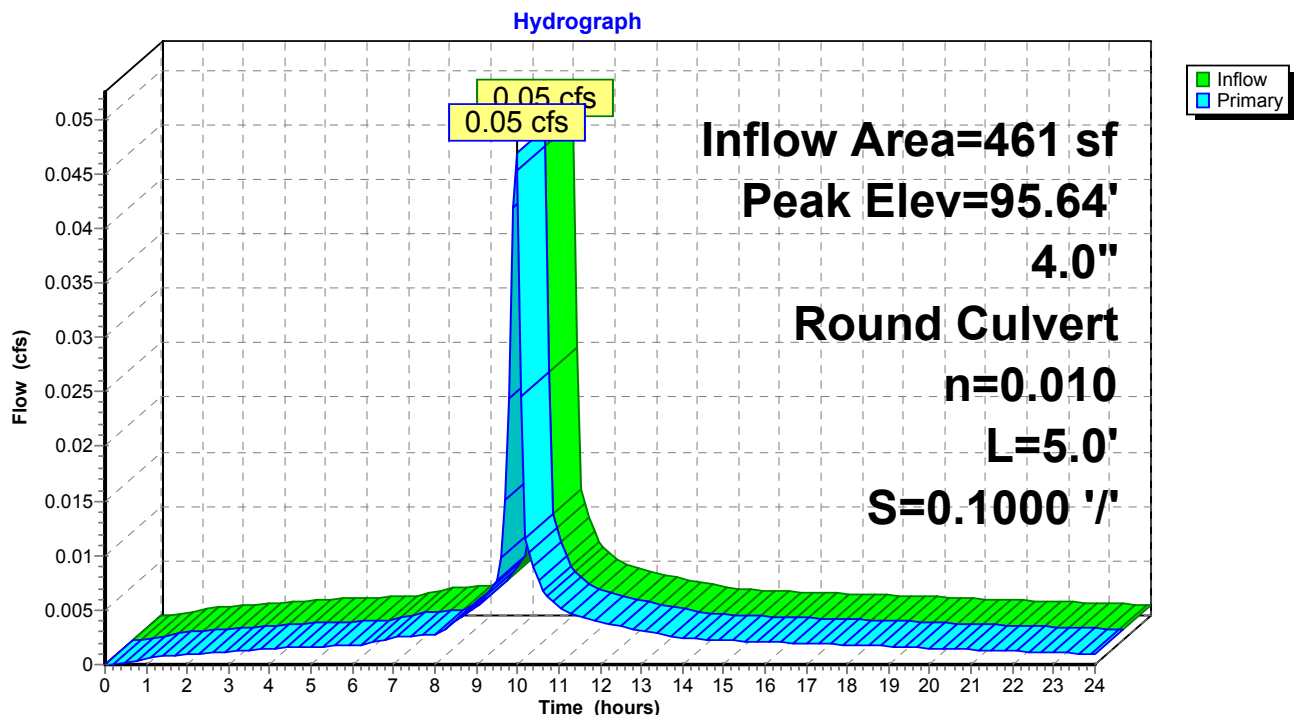
Inflow Area = 461 sf, 100.00% Impervious, Inflow Depth > 6.47" for 25-year Rainfall = 6.71" event
 Inflow = 0.05 cfs @ 9.96 hrs, Volume= 248 cf
 Outflow = 0.05 cfs @ 9.96 hrs, Volume= 248 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 9.96 hrs, Volume= 248 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 95.64' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	4.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.50' / 95.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.04 cfs @ 9.96 hrs HW=95.64' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.04 cfs @ 1.27 fps)

Pond 15P: Catch Basin



Summary for Pond WST-3: Water Storage Tank - 3

Inflow Area = 2,234 sf, 81.47% Impervious, Inflow Depth > 10.52" for 25-year Rainfall = 6.71" event
 Inflow = 0.22 cfs @ 9.97 hrs, Volume= 1,958 cf, Incl. 0.01 cfs Base Flow
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 94.64' @ 24.00 hrs Surf.Area= 256 sf Storage= 1,955 cf

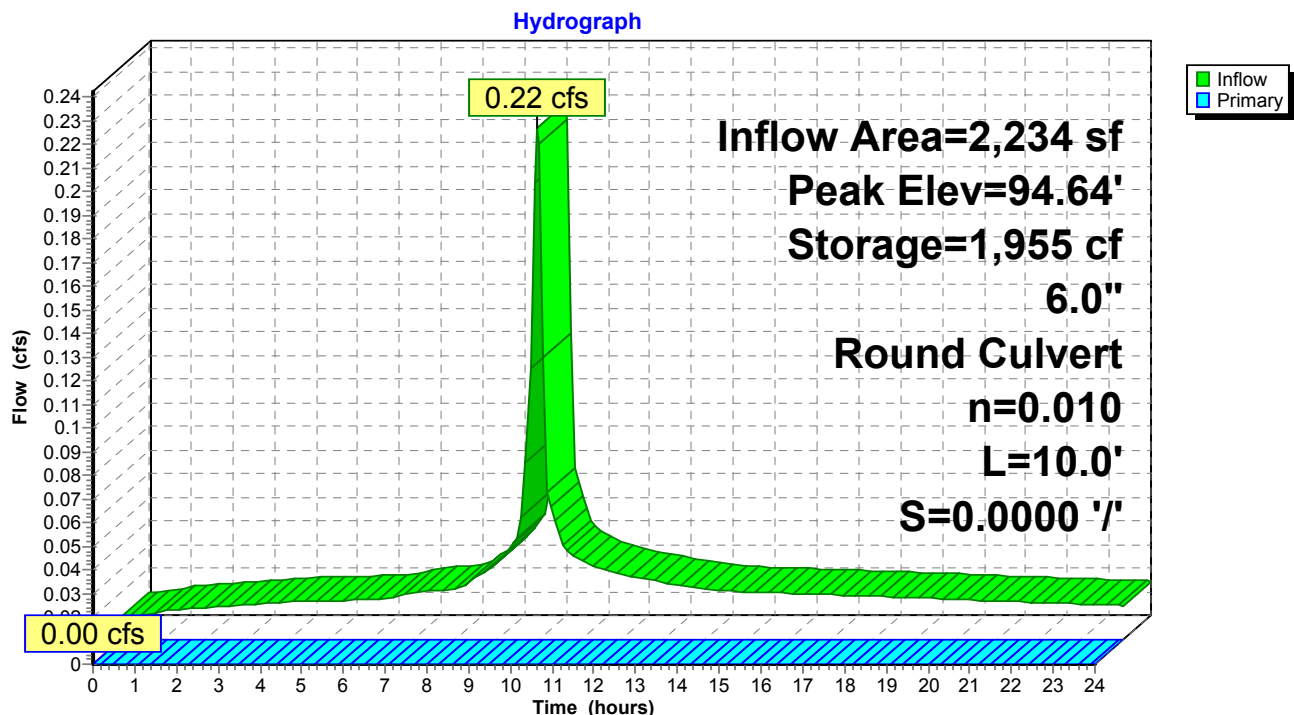
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

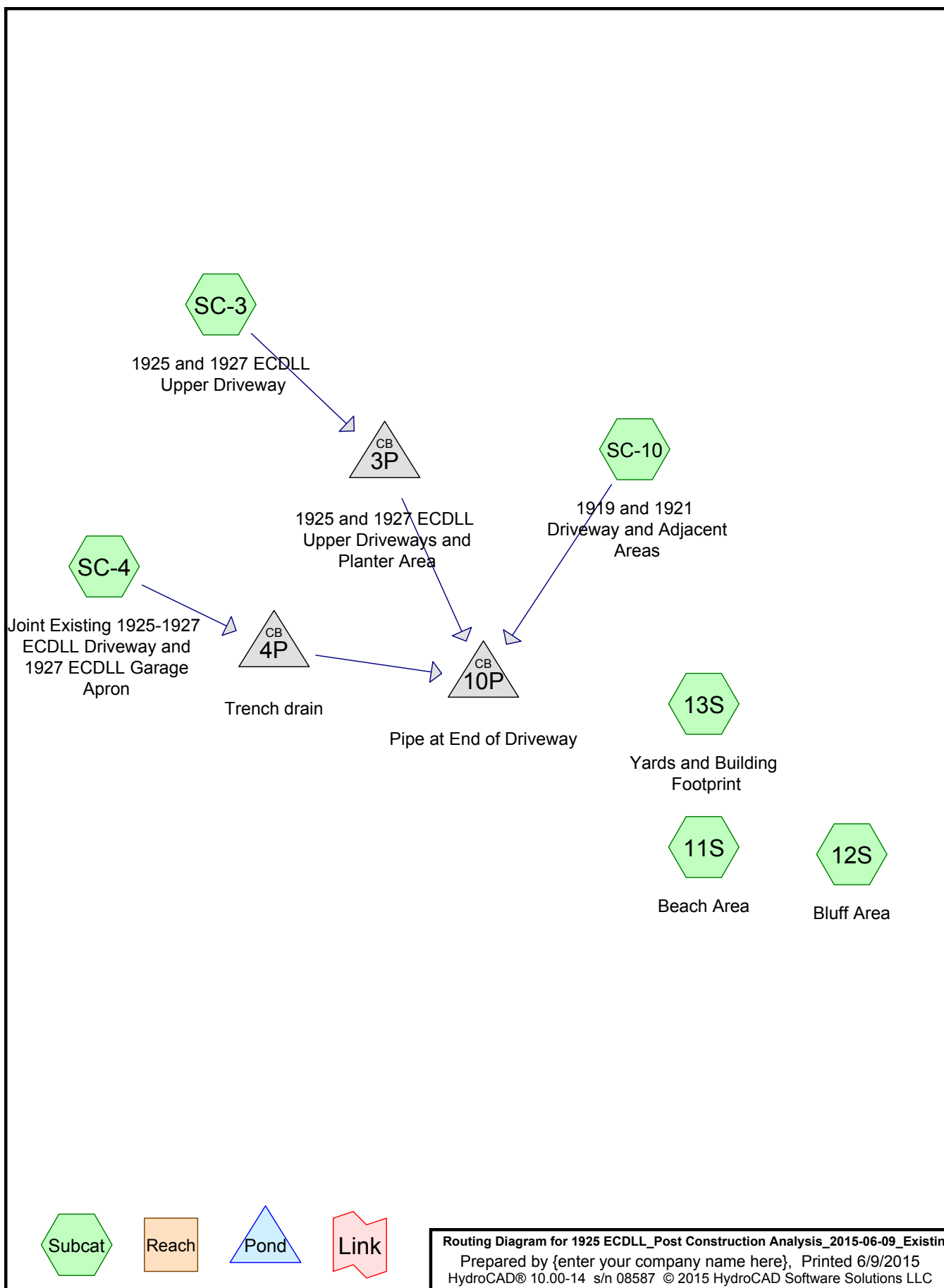
Volume	Invert	Avail.Storage	Storage Description
#1	87.00'	2,048 cf	96.0" W x 96.0" H Box Pipe Storage L= 32.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	95.00'	6.0" Round Culvert L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.00' / 95.00' S= 0.0000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=87.01' (Free Discharge)
 1=Culvert (Controls 0.00 cfs)

Pond WST-3: Water Storage Tank - 3





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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
12,923	68	<50% Grass cover, Poor, HSG A (13S)
1,658	48	Brush, Poor, HSG A (12S)
1,694	83	Brush, Poor, HSG D (11S)
4,387	98	Impervious (SC-10, SC-3, SC-4)
1,442	68	Pervious (SC-10)
416	98	Unconnected roofs, HSG D (11S)
22,520	74	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
14,581	HSG A	12S, 13S
0	HSG B	
0	HSG C	
2,110	HSG D	11S
5,829	Other	SC-10, SC-3, SC-4
22,520		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subo Num
12,923	0	0	0	0	12,923	<50% Grass cover, Poor	
1,658	0	0	1,694	0	3,352	Brush, Poor	
0	0	0	0	4,387	4,387	Impervious	
0	0	0	0	1,442	1,442	Pervious	
0	0	0	416	0	416	Unconnected roofs	
14,581	0	0	2,110	5,829	22,520	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	3P	135.00	128.00	85.0	0.0824	0.010	4.0	0.0	0.0
2	4P	128.50	128.00	20.0	0.0250	0.010	4.0	0.0	0.0
3	10P	124.00	122.00	5.0	0.4000	0.010	6.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points
 Runoff by SBUH method, Split Pervious/Imperv.
 Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment11S: Beach Area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>0.26"
 Tc=0.0 min CN=83/98 Runoff=0.01 cfs 46 cf

Subcatchment12S: Bluff Area Runoff Area=1,658 sf 0.00% Impervious Runoff Depth=0.00"
 Tc=0.0 min CN=48/0 Runoff=0.00 cfs 0 cf

Subcatchment13S: Yards and Building Runoff Area=12,923 sf 0.00% Impervious Runoff Depth>0.00"
 Tc=0.0 min CN=68/0 Runoff=0.00 cfs 1 cf

SubcatchmentSC-10: 1919 and 1921 Runoff Area=3,599 sf 59.93% Impervious Runoff Depth>0.47"
 Flow Length=180' Slope=0.1250 '/' Tc=3.0 min CN=68/98 Runoff=0.03 cfs 142 cf

SubcatchmentSC-3: 1925 and 1927 ECDLL Runoff Area=1,029 sf 100.00% Impervious Runoff Depth>0.79"
 Flow Length=100' Slope=0.0300 '/' Tc=3.0 min CN=0/98 Runoff=0.01 cfs 68 cf

SubcatchmentSC-4: Joint Existing Runoff Area=1,201 sf 100.00% Impervious Runoff Depth>0.79"
 Flow Length=80' Slope=0.1200 '/' Tc=3.0 min CN=0/98 Runoff=0.02 cfs 79 cf

Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Peak Elev=135.08' Inflow=0.01 cfs 68 cf
 4.0" Round Culvert n=0.010 L=85.0' S=0.0824 '/' Outflow=0.01 cfs 68 cf

Pond 4P: Trench drain Peak Elev=128.58' Inflow=0.02 cfs 79 cf
 4.0" Round Culvert n=0.010 L=20.0' S=0.0250 '/' Outflow=0.02 cfs 79 cf

Pond 10P: Pipe at End of Driveway Peak Elev=124.14' Inflow=0.06 cfs 289 cf
 6.0" Round Culvert n=0.010 L=5.0' S=0.4000 '/' Outflow=0.06 cfs 289 cf

Total Runoff Area = 22,520 sf Runoff Volume = 336 cf Average Runoff Depth = 0.18"
78.67% Pervious = 17,717 sf 21.33% Impervious = 4,803 sf

Summary for Subcatchment 11S: Beach Area

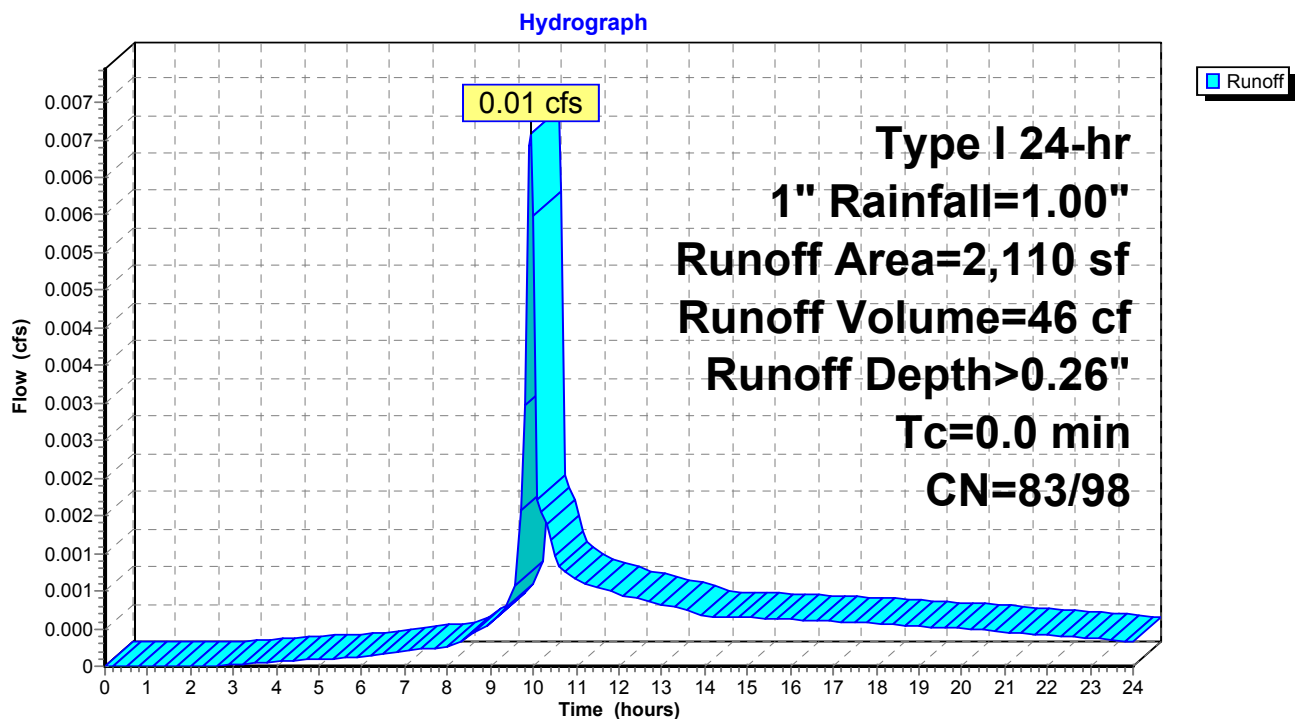
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.01 cfs @ 9.93 hrs, Volume= 46 cf, Depth> 0.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
416	98	Unconnected roofs, HSG D
1,694	83	Brush, Poor, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Subcatchment 11S: Beach Area



Summary for Subcatchment 12S: Bluff Area

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

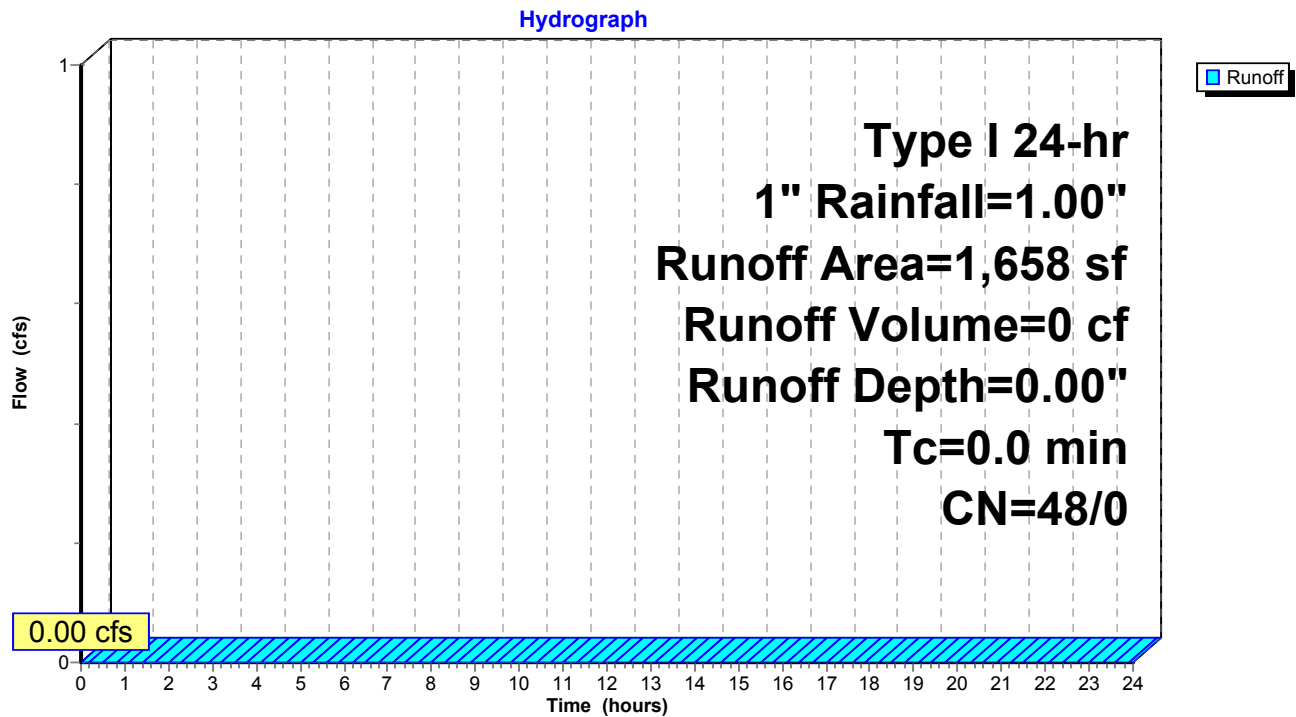
[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Subcatchment 12S: Bluff Area



Summary for Subcatchment 13S: Yards and Building Footprint

This Area is the sum of SC-PRE 2 through 6

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

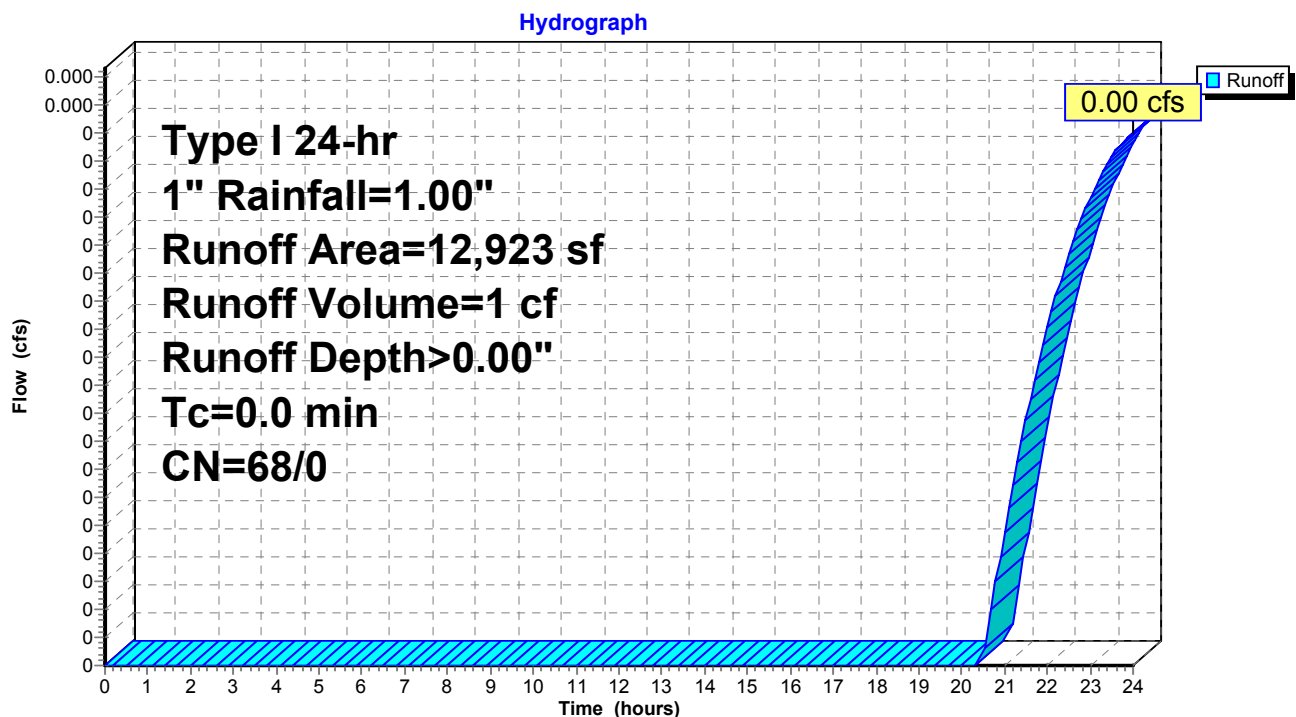
[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 1 cf, Depth> 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
12,923	68	<50% Grass cover, Poor, HSG A
12,923	68	100.00% Pervious Area

Subcatchment 13S: Yards and Building Footprint



Summary for Subcatchment SC-10: 1919 and 1921 Driveway and Adjacent Areas

[49] Hint: $T_c < 2dt$ may require smaller dt

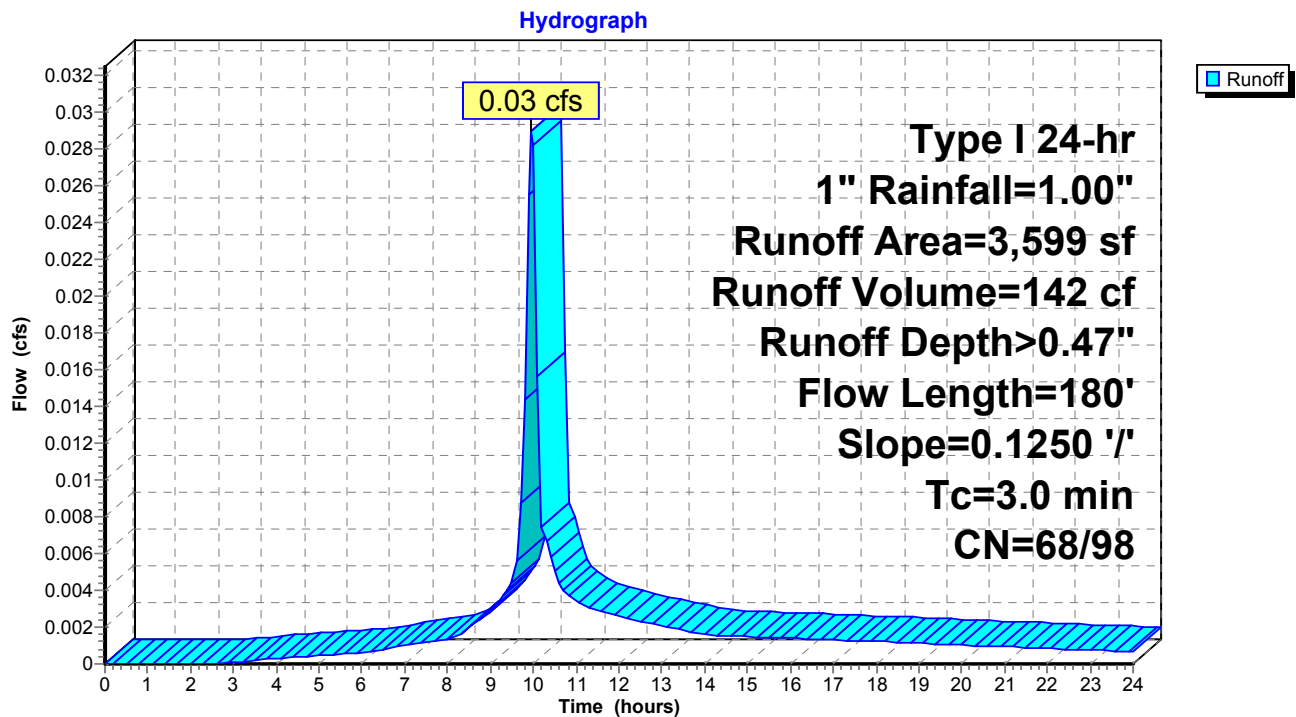
Runoff = 0.03 cfs @ 9.97 hrs, Volume= 142 cf, Depth> 0.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

	Area (sf)	CN	Description
*	2,157	98	Impervious
*	1,442	68	Pervious
	3,599	86	Weighted Average
	1,442	68	40.07% Pervious Area
	2,157	98	59.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	180	0.1250	3.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.9	180	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-10: 1919 and 1921 Driveway and Adjacent Areas



Summary for Subcatchment SC-3: 1925 and 1927 ECDLL Upper Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

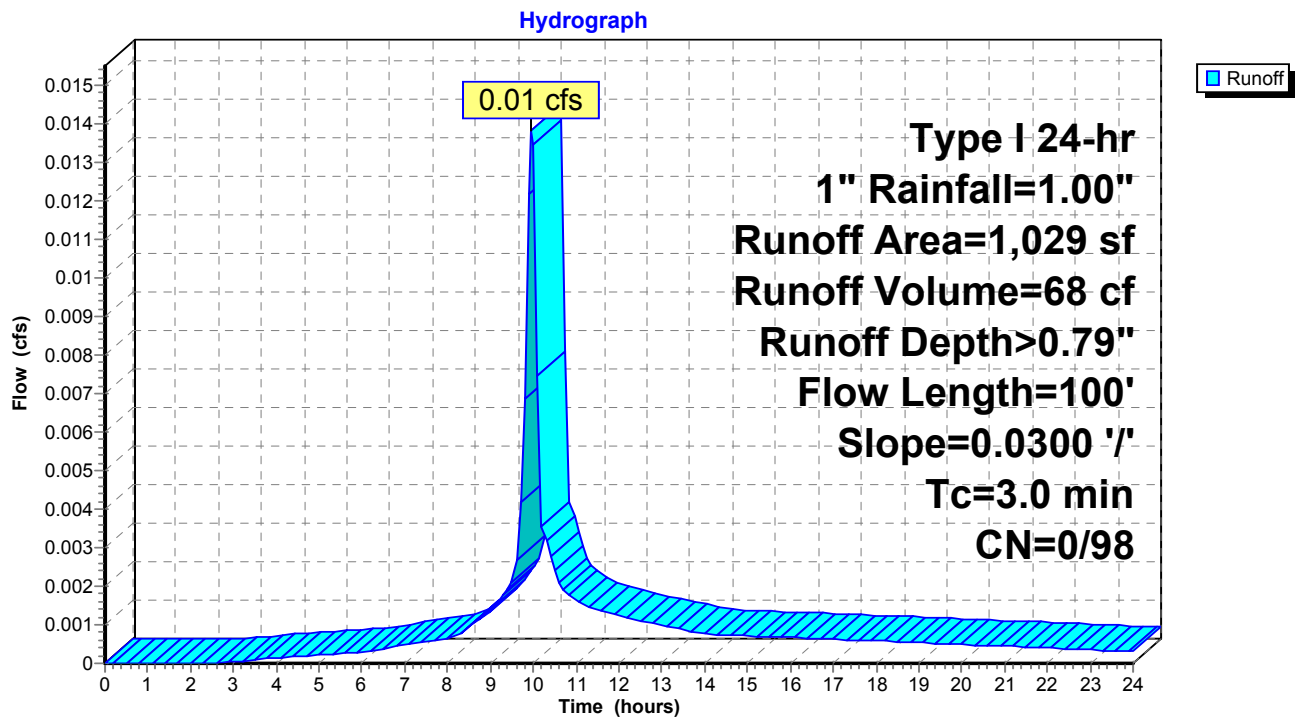
Runoff = 0.01 cfs @ 9.97 hrs, Volume= 68 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
* 1,029	98	Impervious
1,029	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0300	1.26		Sheet Flow, n= 0.015 P2= 3.20"
1.3	100	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-3: 1925 and 1927 ECDLL Upper Driveway



Summary for Subcatchment SC-4: Joint Existing 1925-1927 ECDLL Driveway and 1927 ECDLL Garage Apron

[49] Hint: Tc<2dt may require smaller dt

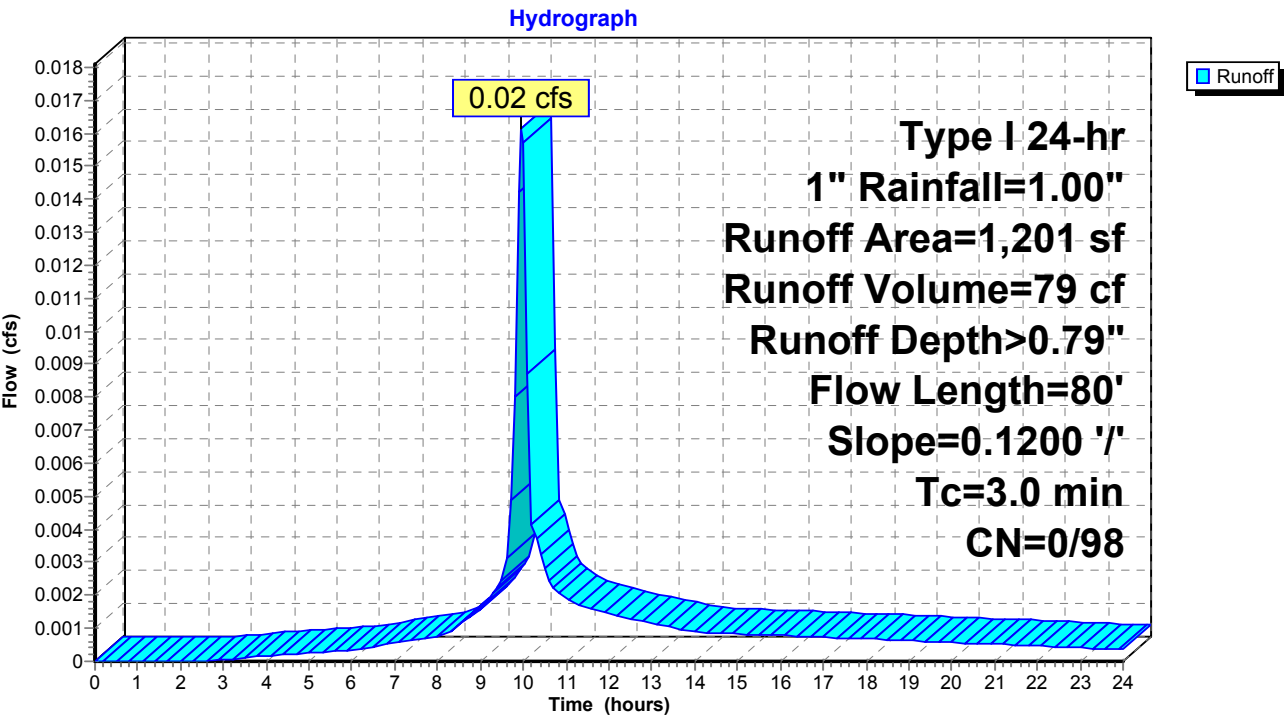
Runoff = 0.02 cfs @ 9.97 hrs, Volume= 79 cf, Depth> 0.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 1" Rainfall=1.00"

Area (sf)	CN	Description
* 1,201	98	Impervious
1,201	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	80	0.1200	2.10		Sheet Flow, n= 0.015 P2= 3.20"
0.6	80	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-4: Joint Existing 1925-1927 ECDLL Driveway and 1927 ECDLL Garage Apron



Summary for Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Area

[57] Hint: Peaked at 135.08' (Flood elevation advised)

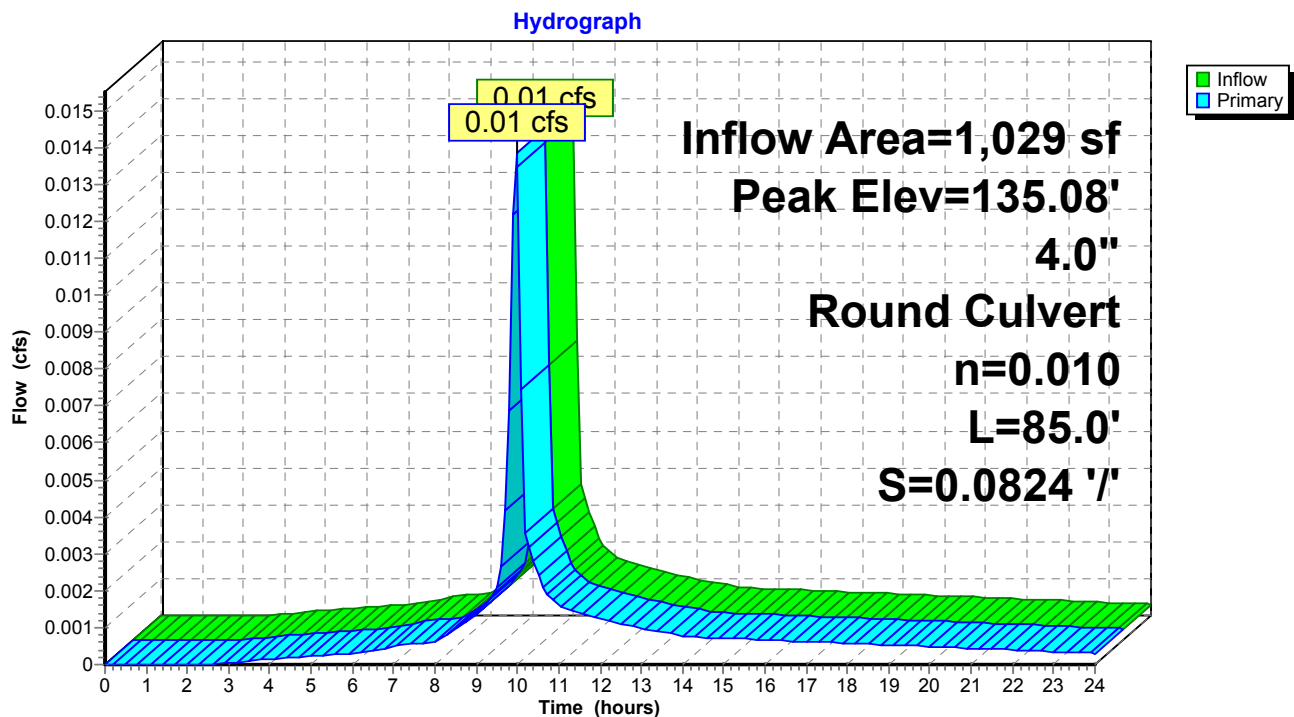
Inflow Area = 1,029 sf, 100.00% Impervious, Inflow Depth > 0.79" for 1" event
 Inflow = 0.01 cfs @ 9.97 hrs, Volume= 68 cf
 Outflow = 0.01 cfs @ 9.97 hrs, Volume= 68 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.01 cfs @ 9.97 hrs, Volume= 68 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 135.08' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	4.0" Round Culvert L= 85.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.00' / 128.00' S= 0.0824 ' S= 0.0824 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 9.97 hrs HW=135.07' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.01 cfs @ 0.92 fps)

Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Area



Summary for Pond 4P: Trench drain

[57] Hint: Peaked at 128.58' (Flood elevation advised)

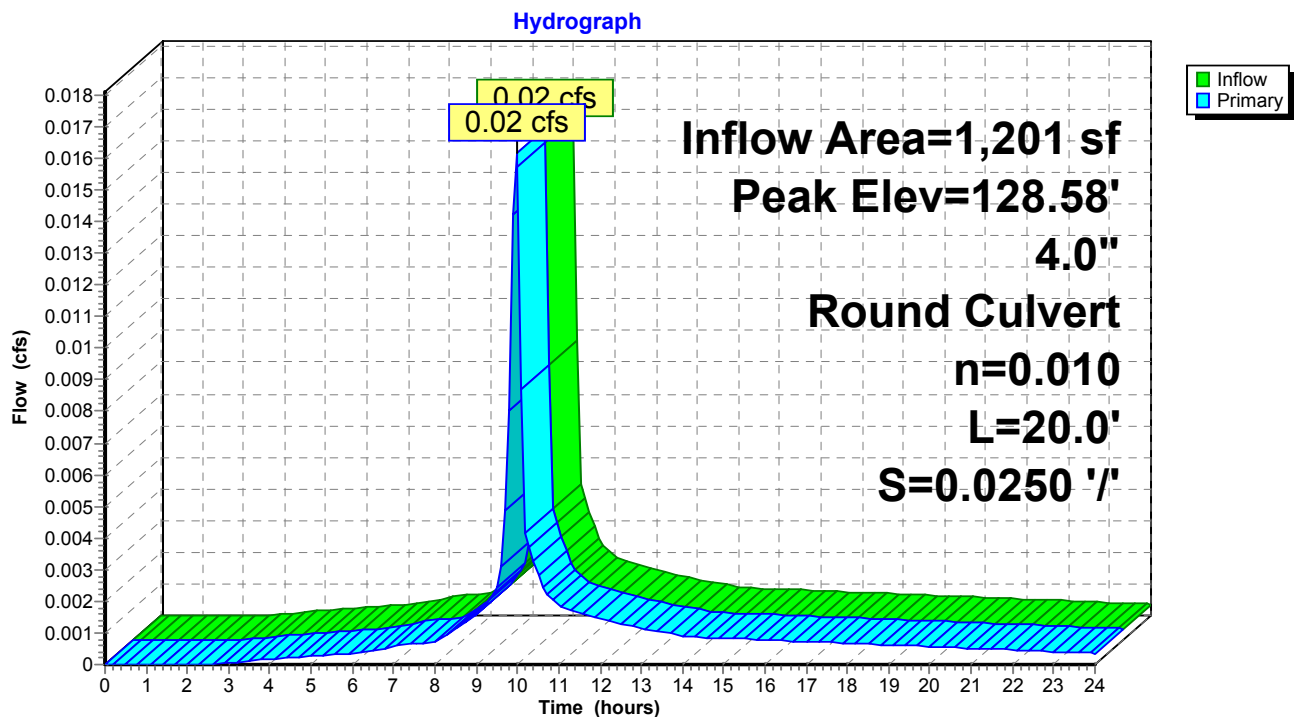
Inflow Area = 1,201 sf, 100.00% Impervious, Inflow Depth > 0.79" for 1" event
 Inflow = 0.02 cfs @ 9.97 hrs, Volume= 79 cf
 Outflow = 0.02 cfs @ 9.97 hrs, Volume= 79 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.02 cfs @ 9.97 hrs, Volume= 79 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 128.58' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	128.50'	4.0" Round Culvert L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.50' / 128.00' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 9.97 hrs HW=128.58' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.02 cfs @ 0.96 fps)

Pond 4P: Trench drain



Summary for Pond 10P: Pipe at End of Driveway

[57] Hint: Peaked at 124.14' (Flood elevation advised)

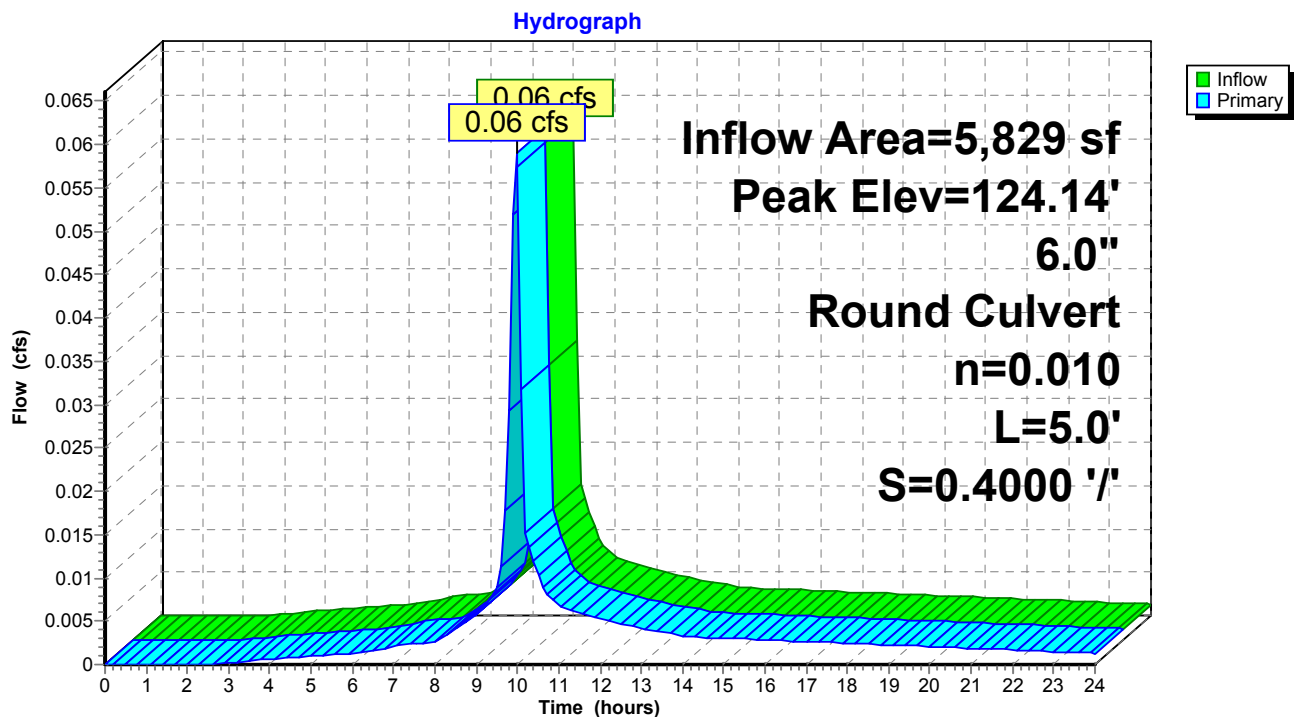
Inflow Area = 5,829 sf, 75.26% Impervious, Inflow Depth > 0.59" for 1" event
 Inflow = 0.06 cfs @ 9.97 hrs, Volume= 289 cf
 Outflow = 0.06 cfs @ 9.97 hrs, Volume= 289 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.06 cfs @ 9.97 hrs, Volume= 289 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 124.14' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	124.00'	6.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 124.00' / 122.00' S= 0.4000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.06 cfs @ 9.97 hrs HW=124.14' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.06 cfs @ 1.26 fps)

Pond 10P: Pipe at End of Driveway



1925 ECDLL_Post Construction Analysis Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment11S: Beach Area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>1.88"
Tc=0.0 min CN=83/98 Runoff=0.07 cfs 330 cf

Subcatchment12S: Bluff Area Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.09"
Tc=0.0 min CN=48/0 Runoff=0.00 cfs 12 cf

Subcatchment13S: Yards and Building Runoff Area=12,923 sf 0.00% Impervious Runoff Depth>0.73"
Tc=0.0 min CN=68/0 Runoff=0.12 cfs 789 cf

SubcatchmentSC-10: 1919 and 1921 Runoff Area=3,599 sf 59.93% Impervious Runoff Depth>2.07"
Flow Length=180' Slope=0.1250 '/' Tc=3.0 min CN=68/98 Runoff=0.12 cfs 621 cf

SubcatchmentSC-3: 1925 and 1927 ECDLL Runoff Area=1,029 sf 100.00% Impervious Runoff Depth>2.97"
Flow Length=100' Slope=0.0300 '/' Tc=3.0 min CN=0/98 Runoff=0.05 cfs 254 cf

SubcatchmentSC-4: Joint Existing Runoff Area=1,201 sf 100.00% Impervious Runoff Depth>2.97"
Flow Length=80' Slope=0.1200 '/' Tc=3.0 min CN=0/98 Runoff=0.06 cfs 297 cf

Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Peak Elev=135.15' Inflow=0.05 cfs 254 cf
4.0" Round Culvert n=0.010 L=85.0' S=0.0824 '/' Outflow=0.05 cfs 254 cf

Pond 4P: Trench drain Peak Elev=128.66' Inflow=0.06 cfs 297 cf
4.0" Round Culvert n=0.010 L=20.0' S=0.0250 '/' Outflow=0.06 cfs 297 cf

Pond 10P: Pipe at End of Driveway Peak Elev=124.29' Inflow=0.22 cfs 1,172 cf
6.0" Round Culvert n=0.010 L=5.0' S=0.4000 '/' Outflow=0.22 cfs 1,172 cf

Total Runoff Area = 22,520 sf Runoff Volume = 2,303 cf Average Runoff Depth = 1.23"
78.67% Pervious = 17,717 sf 21.33% Impervious = 4,803 sf

Summary for Subcatchment 11S: Beach Area

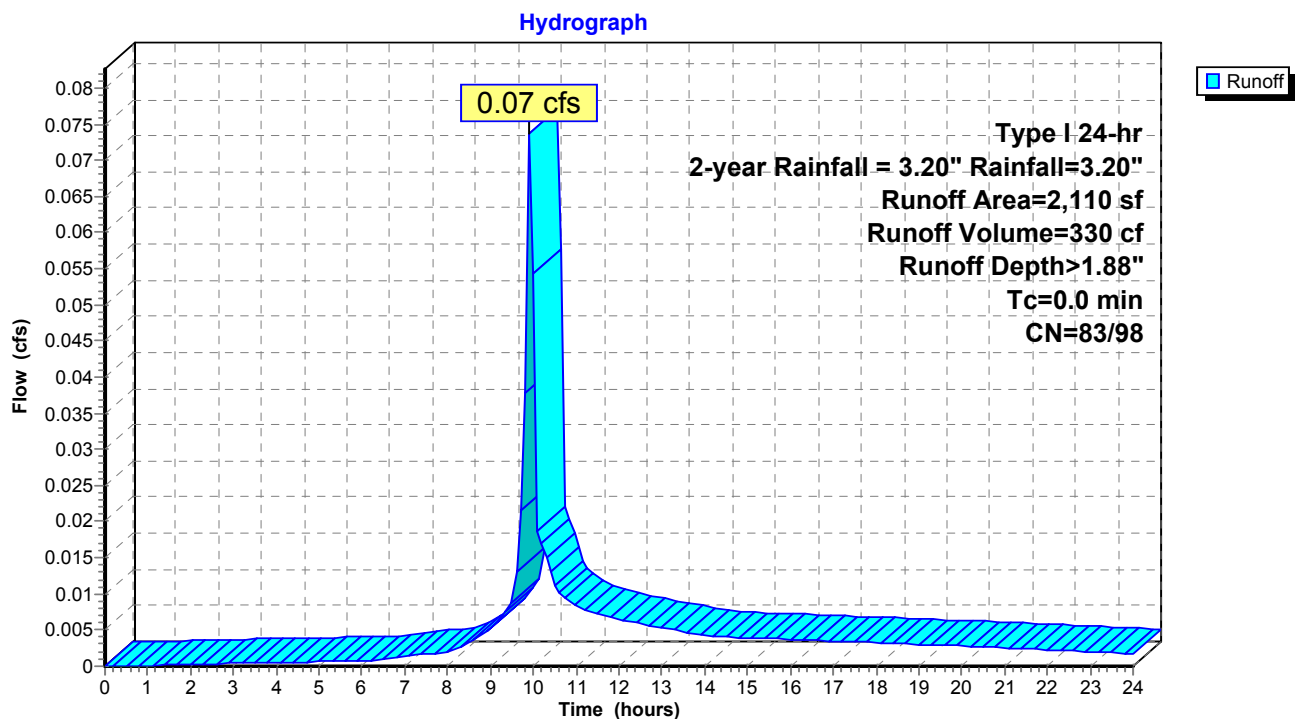
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.07 cfs @ 9.92 hrs, Volume= 330 cf, Depth> 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
416	98	Unconnected roofs, HSG D
1,694	83	Brush, Poor, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Subcatchment 11S: Beach Area



Summary for Subcatchment 12S: Bluff Area

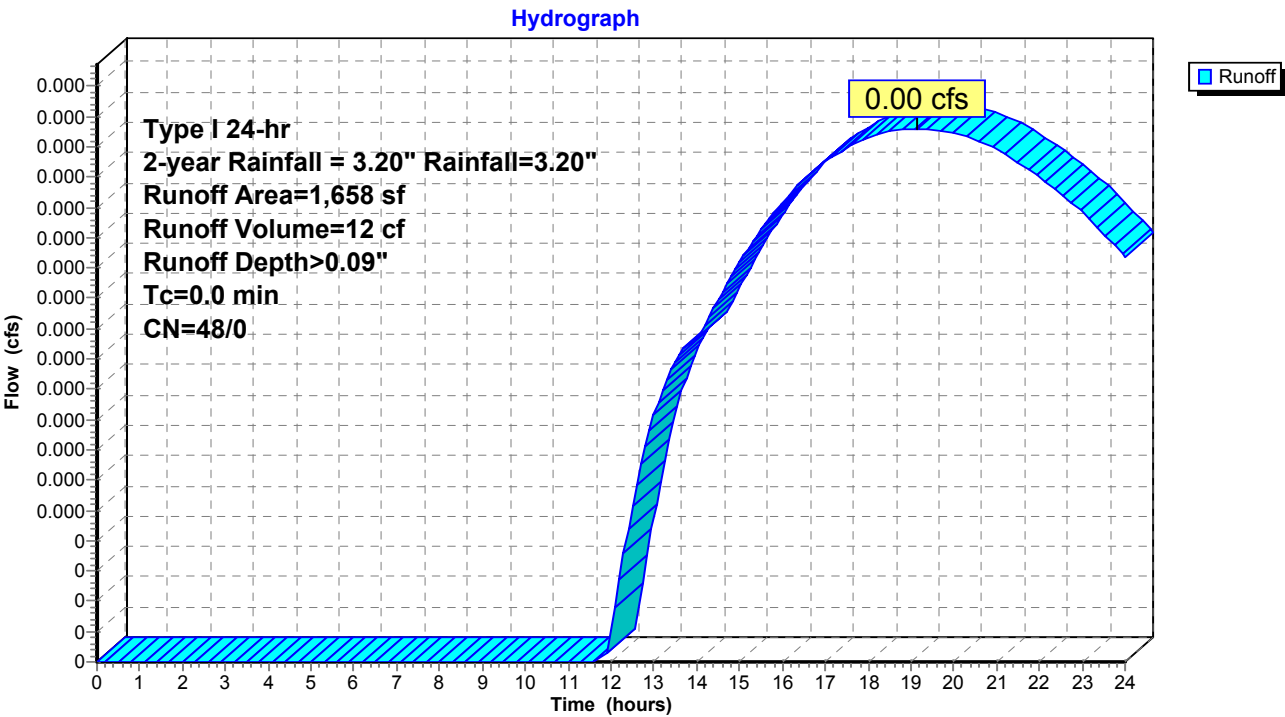
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.00 cfs @ 19.15 hrs, Volume= 12 cf, Depth> 0.09"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Subcatchment 12S: Bluff Area



Summary for Subcatchment 13S: Yards and Building Footprint

This Area is the sum of SC-PRE 2 through 6

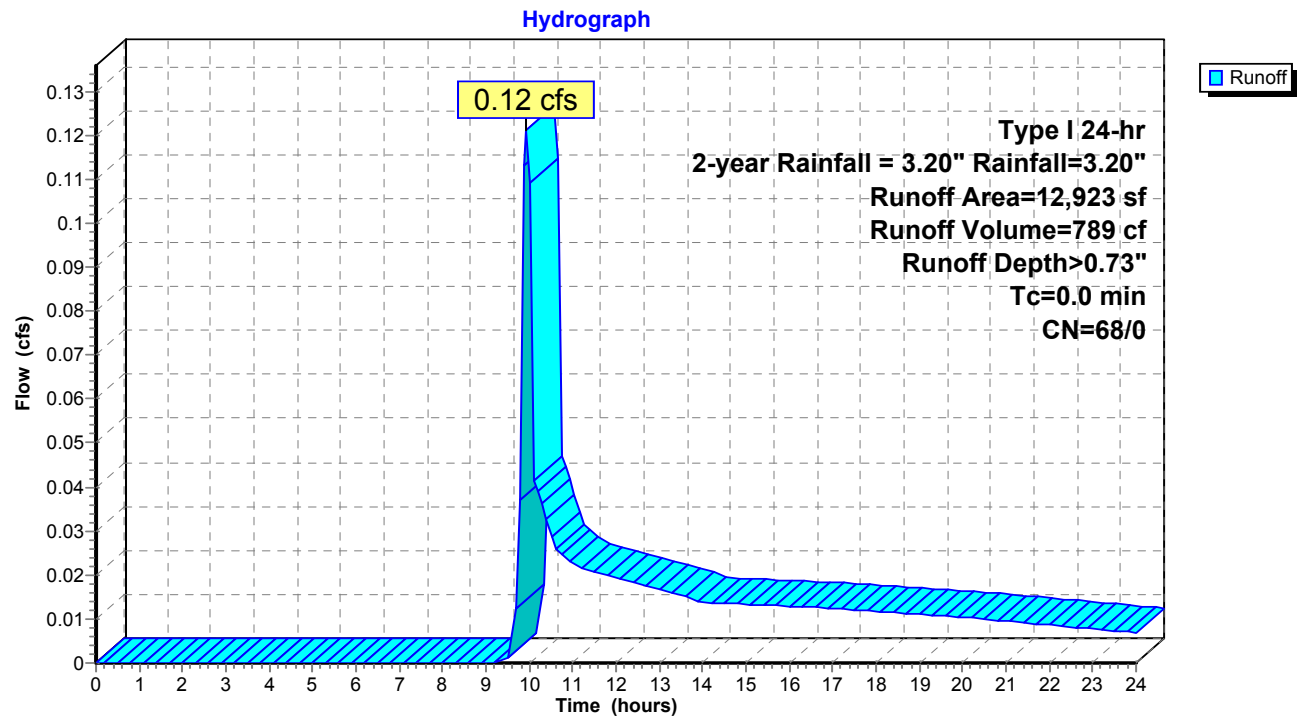
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.12 cfs @ 9.95 hrs, Volume= 789 cf, Depth> 0.73"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
12,923	68	<50% Grass cover, Poor, HSG A
12,923	68	100.00% Pervious Area

Subcatchment 13S: Yards and Building Footprint



Summary for Subcatchment SC-10: 1919 and 1921 Driveway and Adjacent Areas

[49] Hint: $T_c < 2dt$ may require smaller dt

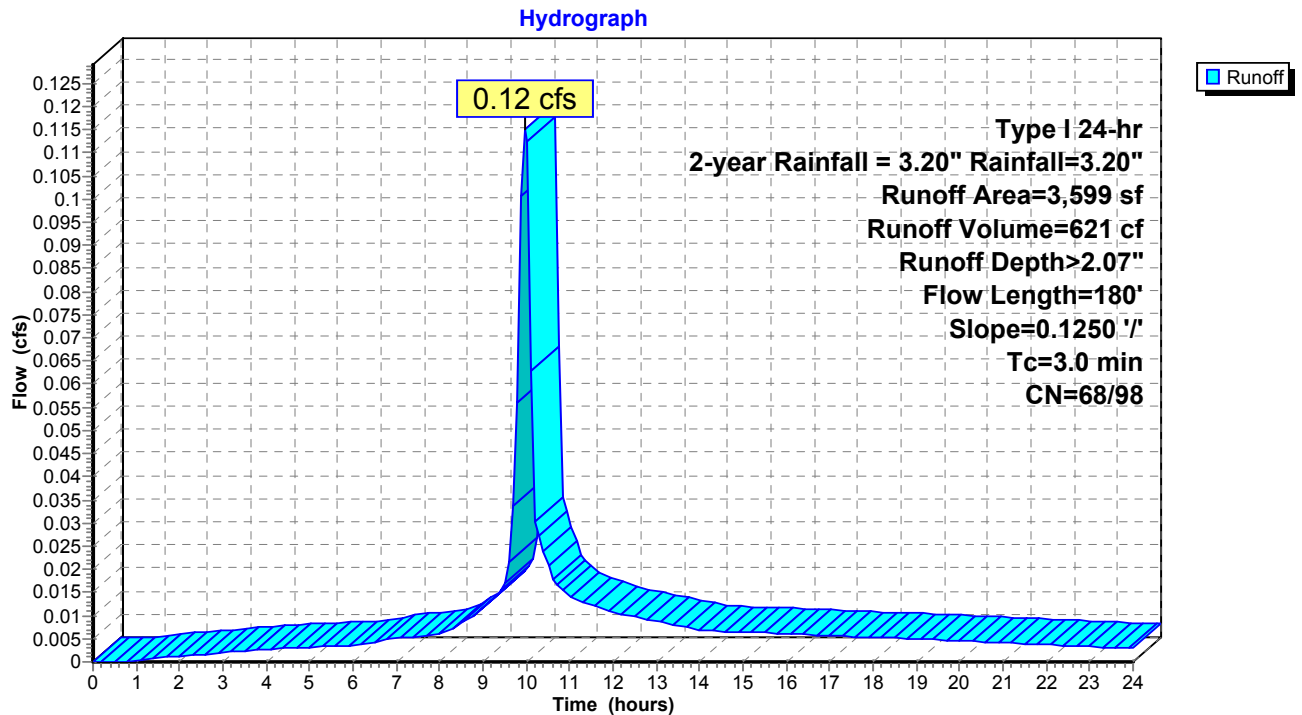
Runoff = 0.12 cfs @ 9.97 hrs, Volume= 621 cf, Depth> 2.07"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt = 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

	Area (sf)	CN	Description
*	2,157	98	Impervious
*	1,442	68	Pervious
	3,599	86	Weighted Average
	1,442	68	40.07% Pervious Area
	2,157	98	59.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	180	0.1250	3.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.9	180	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-10: 1919 and 1921 Driveway and Adjacent Areas



Summary for Subcatchment SC-3: 1925 and 1927 ECDLL Upper Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

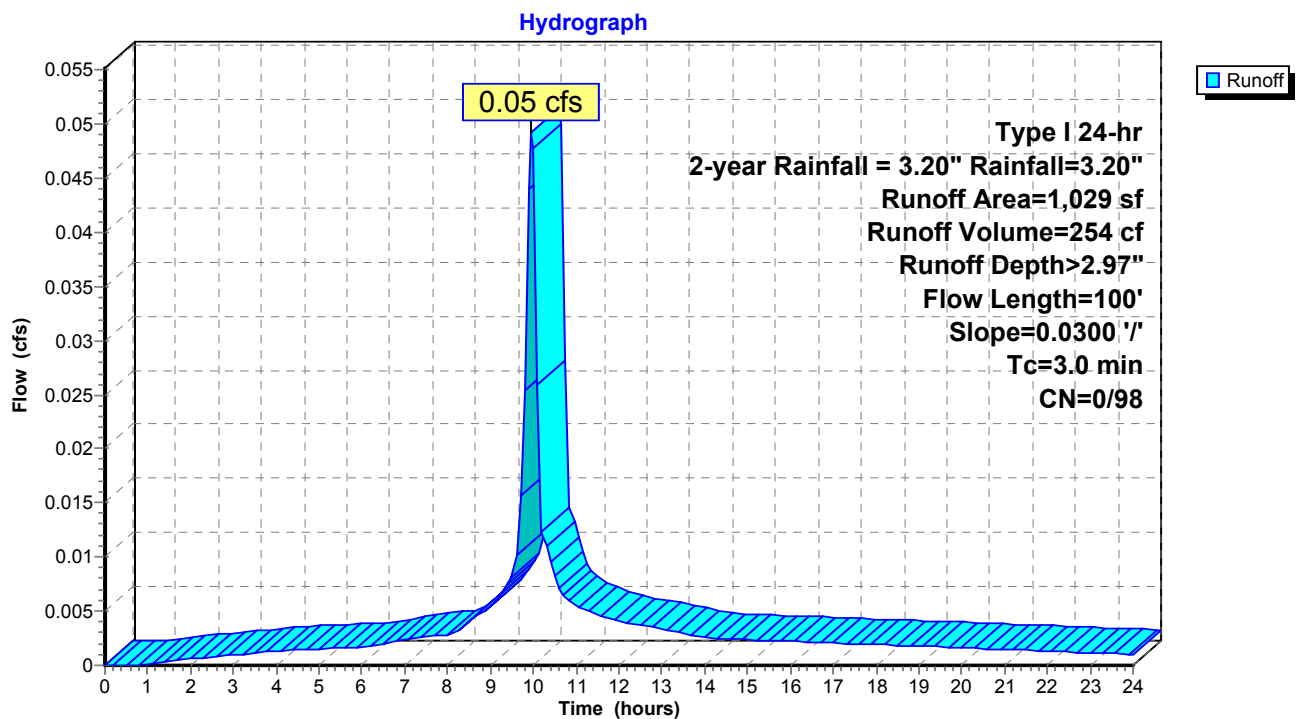
Runoff = 0.05 cfs @ 9.96 hrs, Volume= 254 cf, Depth> 2.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
* 1,029	98	Impervious
1,029	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0300	1.26		Sheet Flow, n= 0.015 P2= 3.20"
1.3	100	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-3: 1925 and 1927 ECDLL Upper Driveway



Summary for Subcatchment SC-4: Joint Existing 1925-1927 ECDLL Driveway and 1927 ECDLL Garage Apron

[49] Hint: Tc<2dt may require smaller dt

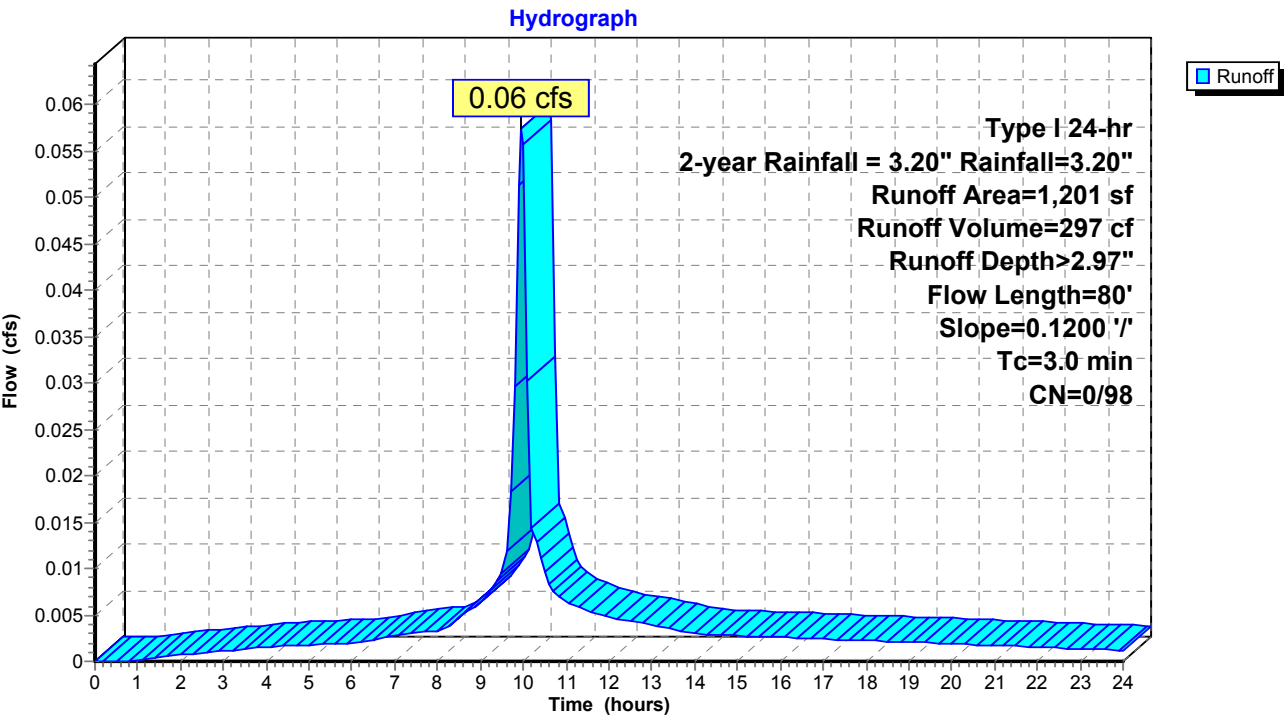
Runoff = 0.06 cfs @ 9.96 hrs, Volume= 297 cf, Depth> 2.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 2-year Rainfall = 3.20" Rainfall=3.20"

Area (sf)	CN	Description
*	1,201	98 Impervious
1,201	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	80	0.1200	2.10		Sheet Flow, n= 0.015 P2= 3.20"
0.6	80	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-4: Joint Existing 1925-1927 ECDLL Driveway and 1927 ECDLL Garage Apron



Summary for Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Area

[57] Hint: Peaked at 135.15' (Flood elevation advised)

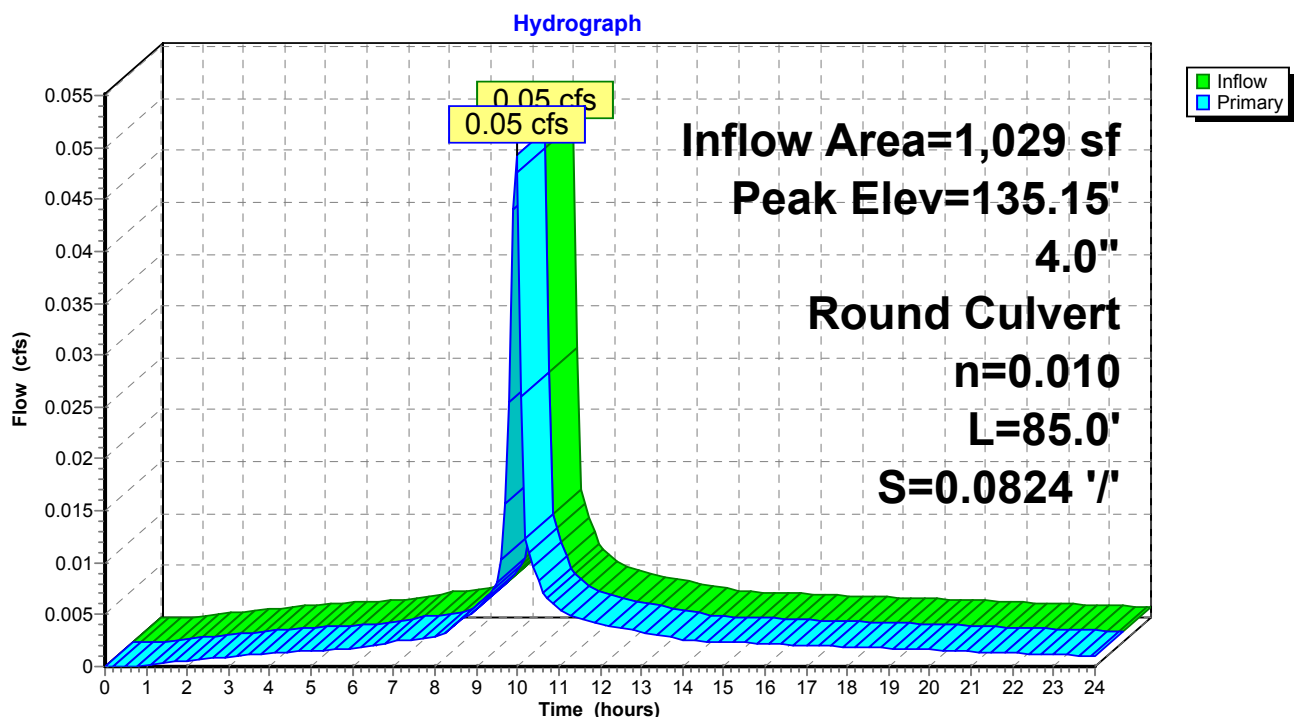
Inflow Area = 1,029 sf, 100.00% Impervious, Inflow Depth > 2.97" for 2-year Rainfall = 3.20" event
 Inflow = 0.05 cfs @ 9.96 hrs, Volume= 254 cf
 Outflow = 0.05 cfs @ 9.96 hrs, Volume= 254 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.05 cfs @ 9.96 hrs, Volume= 254 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 135.15' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	4.0" Round Culvert L= 85.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.00' / 128.00' S= 0.0824 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.05 cfs @ 9.96 hrs HW=135.14' (Free Discharge)
 1=Culvert (Inlet Controls 0.05 cfs @ 1.29 fps)

Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Area



Summary for Pond 4P: Trench drain

[57] Hint: Peaked at 128.66' (Flood elevation advised)

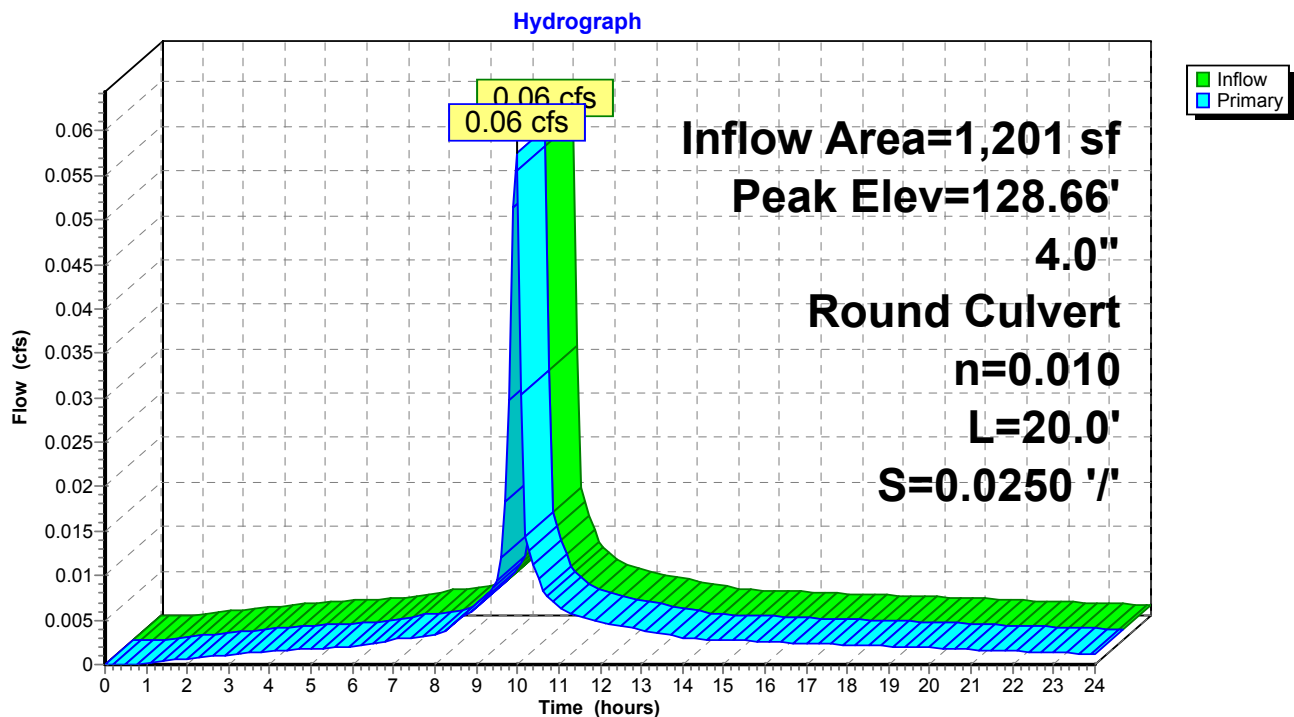
Inflow Area = 1,201 sf, 100.00% Impervious, Inflow Depth > 2.97" for 2-year Rainfall = 3.20" event
 Inflow = 0.06 cfs @ 9.96 hrs, Volume= 297 cf
 Outflow = 0.06 cfs @ 9.96 hrs, Volume= 297 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.06 cfs @ 9.96 hrs, Volume= 297 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 128.66' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	128.50'	4.0" Round Culvert L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.50' / 128.00' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.05 cfs @ 9.96 hrs HW=128.66' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.05 cfs @ 1.35 fps)

Pond 4P: Trench drain



Summary for Pond 10P: Pipe at End of Driveway

[57] Hint: Peaked at 124.29' (Flood elevation advised)

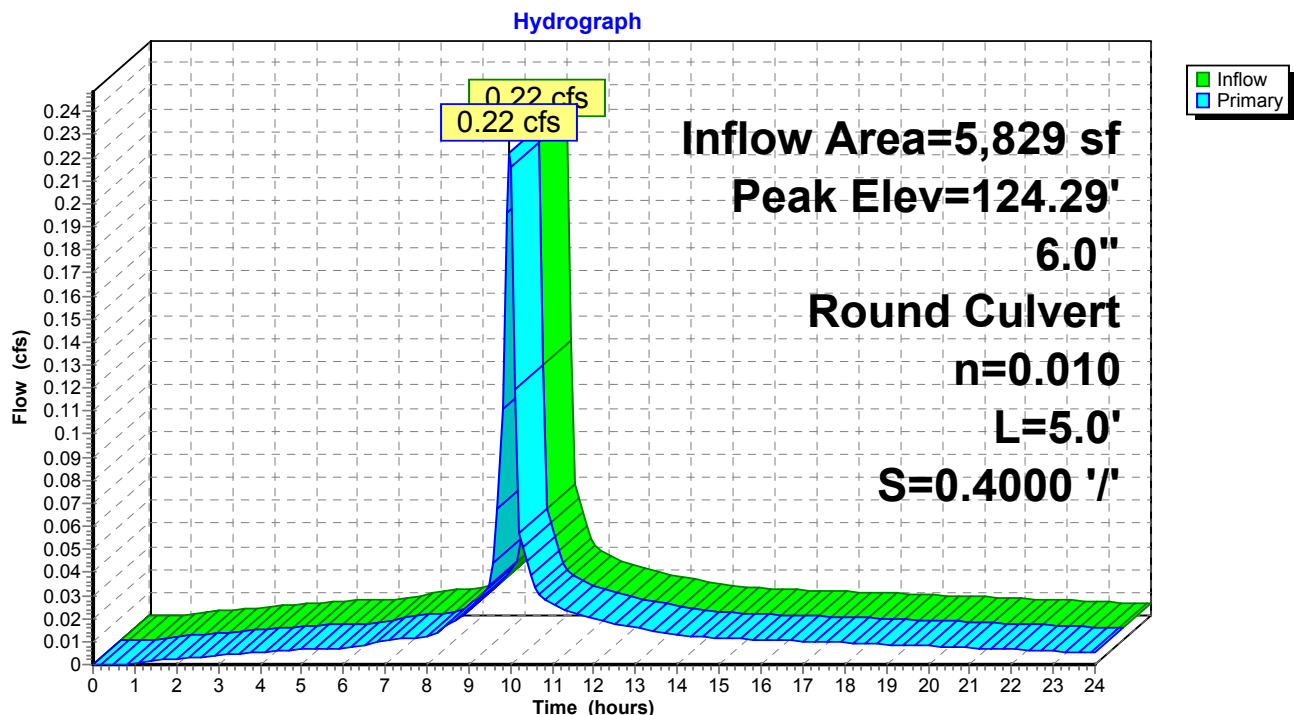
Inflow Area = 5,829 sf, 75.26% Impervious, Inflow Depth > 2.41" for 2-year Rainfall = 3.20" event
 Inflow = 0.22 cfs @ 9.97 hrs, Volume= 1,172 cf
 Outflow = 0.22 cfs @ 9.97 hrs, Volume= 1,172 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.22 cfs @ 9.97 hrs, Volume= 1,172 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 124.29' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	124.00'	6.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 124.00' / 122.00' S= 0.4000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.21 cfs @ 9.97 hrs HW=124.28' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.21 cfs @ 1.81 fps)

Pond 10P: Pipe at End of Driveway



1925 ECDLL_Post Construction Analysis Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment11S: Beach Area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>3.13"
Tc=0.0 min CN=83/98 Runoff=0.13 cfs 550 cf

Subcatchment12S: Bluff Area Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.45"
Tc=0.0 min CN=48/0 Runoff=0.00 cfs 62 cf

Subcatchment13S: Yards and Building Runoff Area=12,923 sf 0.00% Impervious Runoff Depth>1.61"
Tc=0.0 min CN=68/0 Runoff=0.34 cfs 1,731 cf

SubcatchmentSC-10: 1919 and 1921 Runoff Area=3,599 sf 59.93% Impervious Runoff Depth>3.26"
Flow Length=180' Slope=0.1250 '/' Tc=3.0 min CN=68/98 Runoff=0.18 cfs 979 cf

SubcatchmentSC-3: 1925 and 1927 ECDLL Runoff Area=1,029 sf 100.00% Impervious Runoff Depth>4.37"
Flow Length=100' Slope=0.0300 '/' Tc=3.0 min CN=0/98 Runoff=0.07 cfs 375 cf

SubcatchmentSC-4: Joint Existing Runoff Area=1,201 sf 100.00% Impervious Runoff Depth>4.37"
Flow Length=80' Slope=0.1200 '/' Tc=3.0 min CN=0/98 Runoff=0.08 cfs 437 cf

Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Peak Elev=135.18' Inflow=0.07 cfs 375 cf
4.0" Round Culvert n=0.010 L=85.0' S=0.0824 '/' Outflow=0.07 cfs 375 cf

Pond 4P: Trench drain Peak Elev=128.70' Inflow=0.08 cfs 437 cf
4.0" Round Culvert n=0.010 L=20.0' S=0.0250 '/' Outflow=0.08 cfs 437 cf

Pond 10P: Pipe at End of Driveway Peak Elev=124.38' Inflow=0.34 cfs 1,791 cf
6.0" Round Culvert n=0.010 L=5.0' S=0.4000 '/' Outflow=0.34 cfs 1,791 cf

Total Runoff Area = 22,520 sf Runoff Volume = 4,134 cf Average Runoff Depth = 2.20"
78.67% Pervious = 17,717 sf 21.33% Impervious = 4,803 sf

Summary for Subcatchment 11S: Beach Area

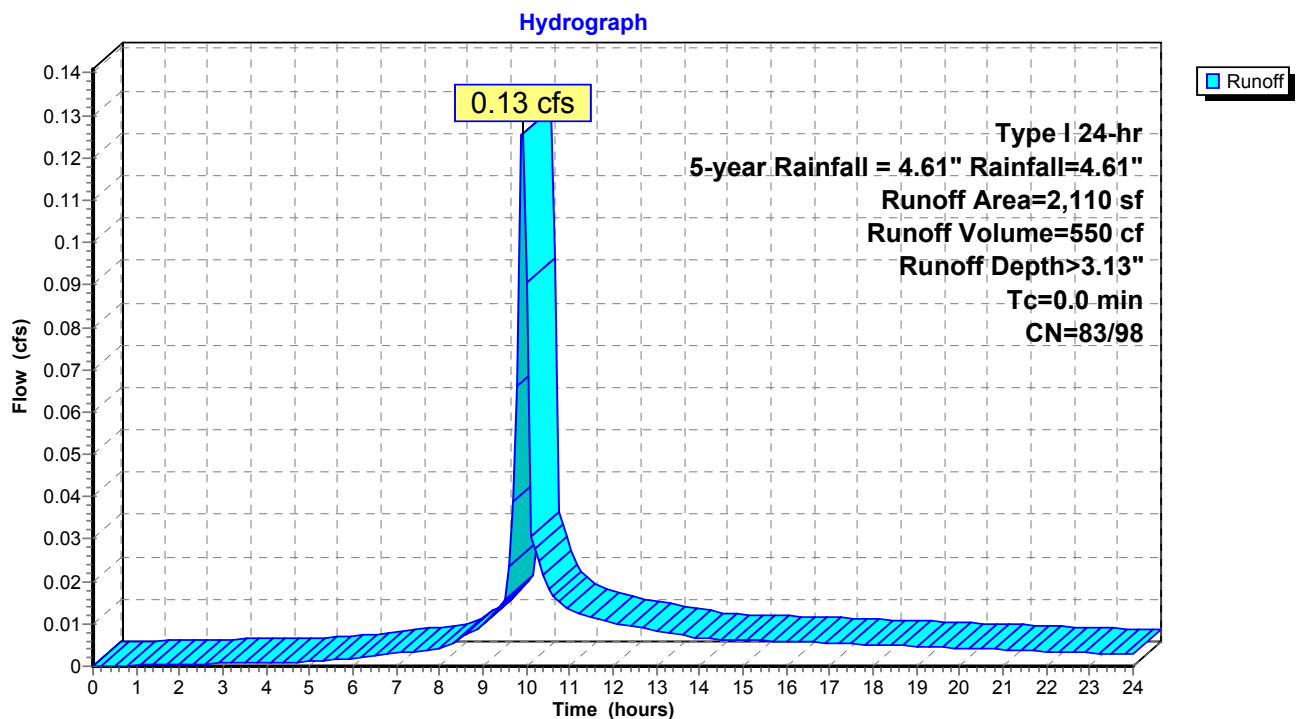
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.13 cfs @ 9.91 hrs, Volume= 550 cf, Depth> 3.13"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
416	98	Unconnected roofs, HSG D
1,694	83	Brush, Poor, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Subcatchment 11S: Beach Area



Summary for Subcatchment 12S: Bluff Area

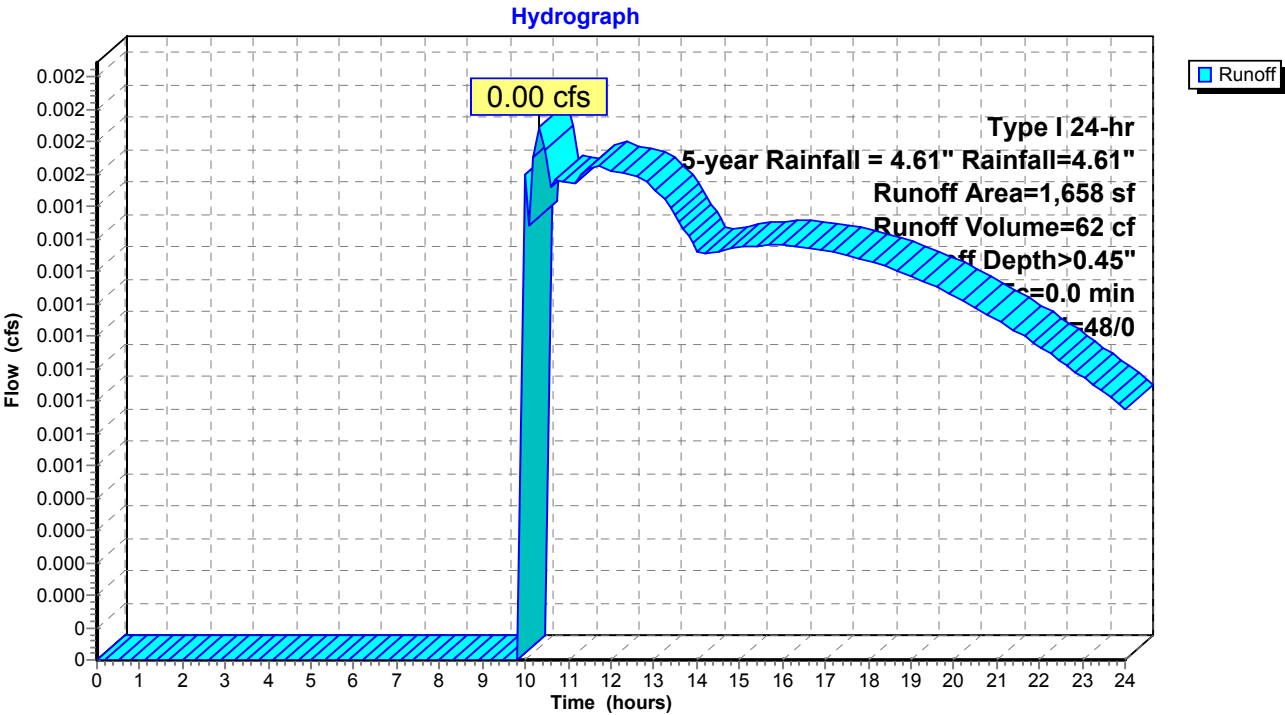
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.00 cfs @ 10.34 hrs, Volume= 62 cf, Depth> 0.45"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Subcatchment 12S: Bluff Area



Summary for Subcatchment 13S: Yards and Building Footprint

This Area is the sum of SC-PRE 2 through 6

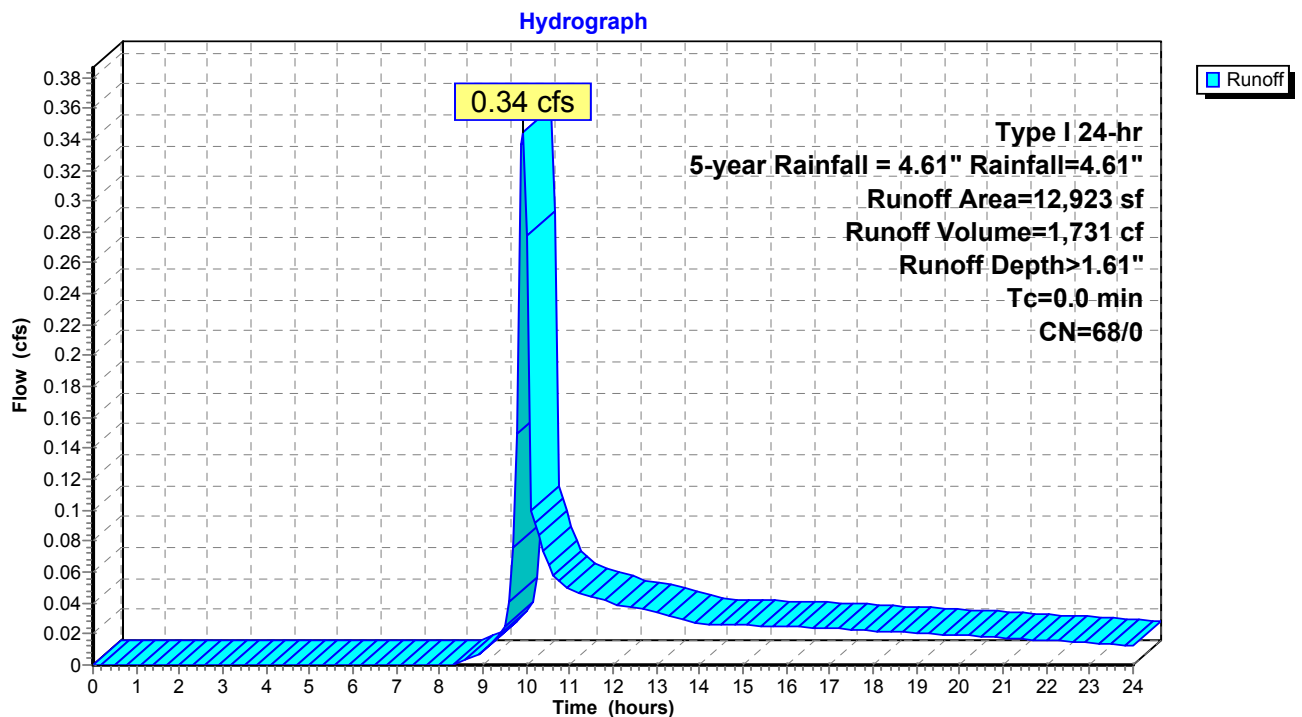
[46] Hint: $T_c=0$ (Instant runoff peak depends on dt)

Runoff = 0.34 cfs @ 9.93 hrs, Volume= 1,731 cf, Depth> 1.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
12,923	68	<50% Grass cover, Poor, HSG A
12,923	68	100.00% Pervious Area

Subcatchment 13S: Yards and Building Footprint



Summary for Subcatchment SC-10: 1919 and 1921 Driveway and Adjacent Areas

[49] Hint: $T_c < 2dt$ may require smaller dt

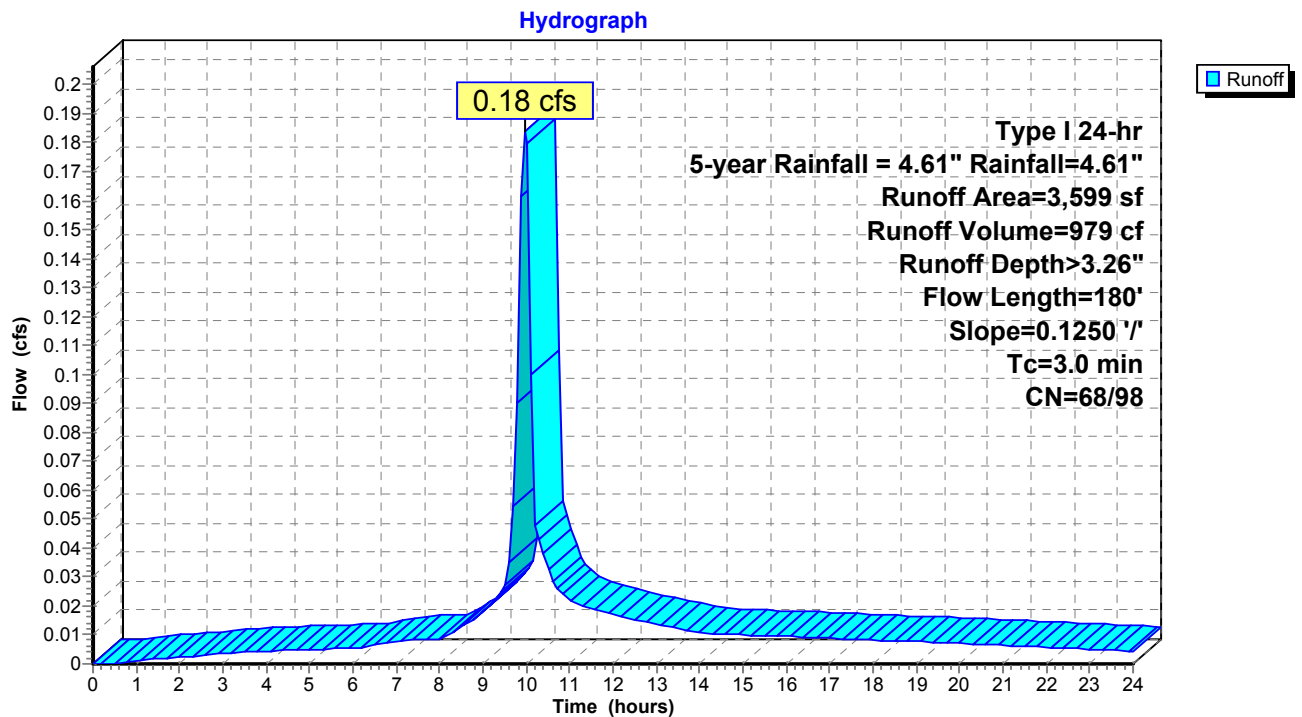
Runoff = 0.18 cfs @ 9.97 hrs, Volume= 979 cf, Depth> 3.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

	Area (sf)	CN	Description
*	2,157	98	Impervious
*	1,442	68	Pervious
	3,599	86	Weighted Average
	1,442	68	40.07% Pervious Area
	2,157	98	59.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	180	0.1250	3.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.9	180	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-10: 1919 and 1921 Driveway and Adjacent Areas



Summary for Subcatchment SC-3: 1925 and 1927 ECDLL Upper Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

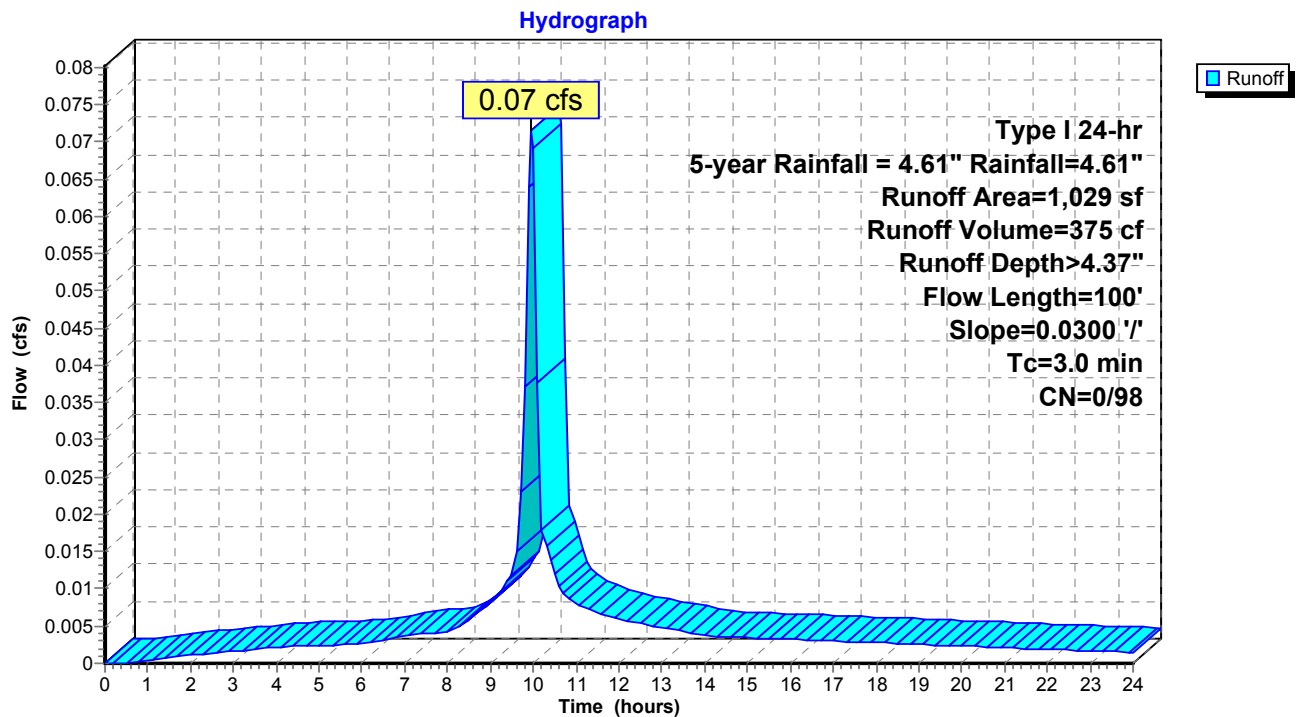
Runoff = 0.07 cfs @ 9.96 hrs, Volume= 375 cf, Depth> 4.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
* 1,029	98	Impervious
1,029	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0300	1.26		Sheet Flow, n= 0.015 P2= 3.20"
1.3	100	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-3: 1925 and 1927 ECDLL Upper Driveway



Summary for Subcatchment SC-4: Joint Existing 1925-1927 ECDLL Driveway and 1927 ECDLL Garage Apron

[49] Hint: $T_c < 2dt$ may require smaller dt

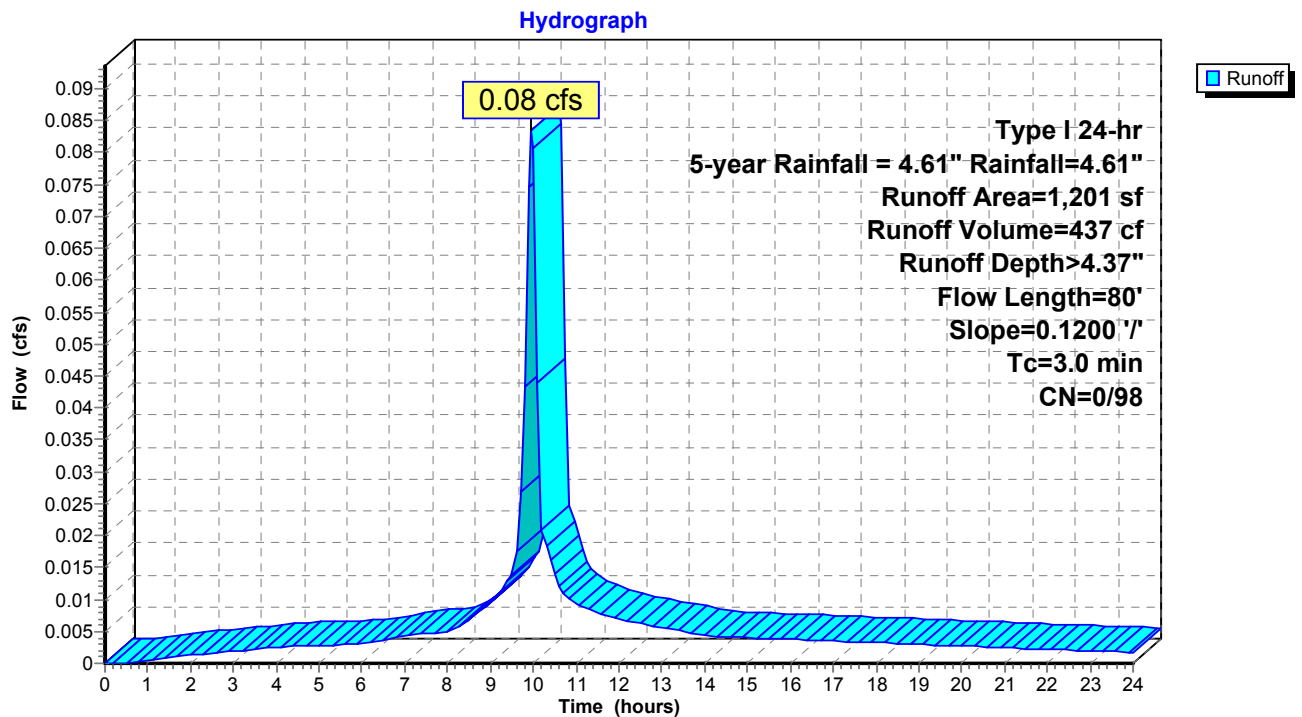
Runoff = 0.08 cfs @ 9.96 hrs, Volume= 437 cf, Depth> 4.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt=0.10$ hrs
 Type I 24-hr 5-year Rainfall = 4.61" Rainfall=4.61"

Area (sf)	CN	Description
* 1,201	98	Impervious
1,201	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	80	0.1200	2.10		Sheet Flow, n= 0.015 P2= 3.20"
0.6	80	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-4: Joint Existing 1925-1927 ECDLL Driveway and 1927 ECDLL Garage Apron



Summary for Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Area

[57] Hint: Peaked at 135.18' (Flood elevation advised)

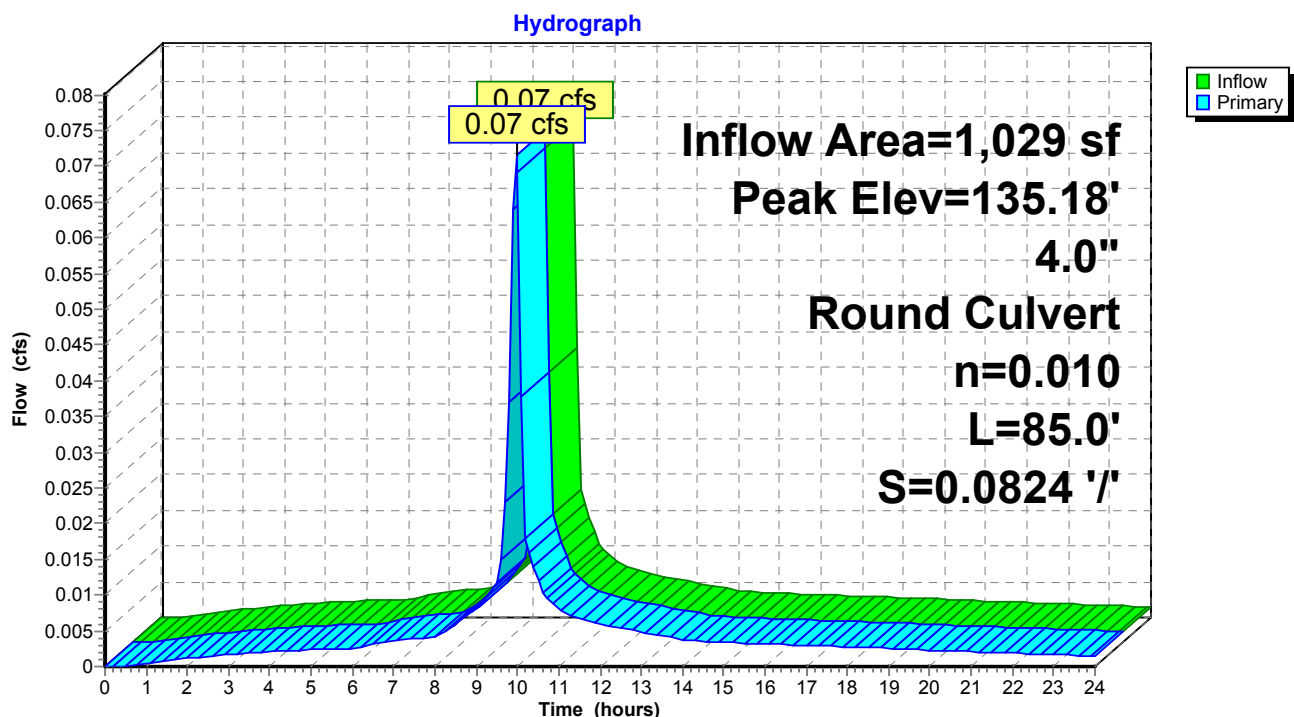
Inflow Area = 1,029 sf, 100.00% Impervious, Inflow Depth > 4.37" for 5-year Rainfall = 4.61" event
 Inflow = 0.07 cfs @ 9.96 hrs, Volume= 375 cf
 Outflow = 0.07 cfs @ 9.96 hrs, Volume= 375 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.07 cfs @ 9.96 hrs, Volume= 375 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 135.18' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	4.0" Round Culvert L= 85.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.00' / 128.00' S= 0.0824 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.07 cfs @ 9.96 hrs HW=135.18' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.07 cfs @ 1.43 fps)

Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Area



Summary for Pond 4P: Trench drain

[57] Hint: Peaked at 128.70' (Flood elevation advised)

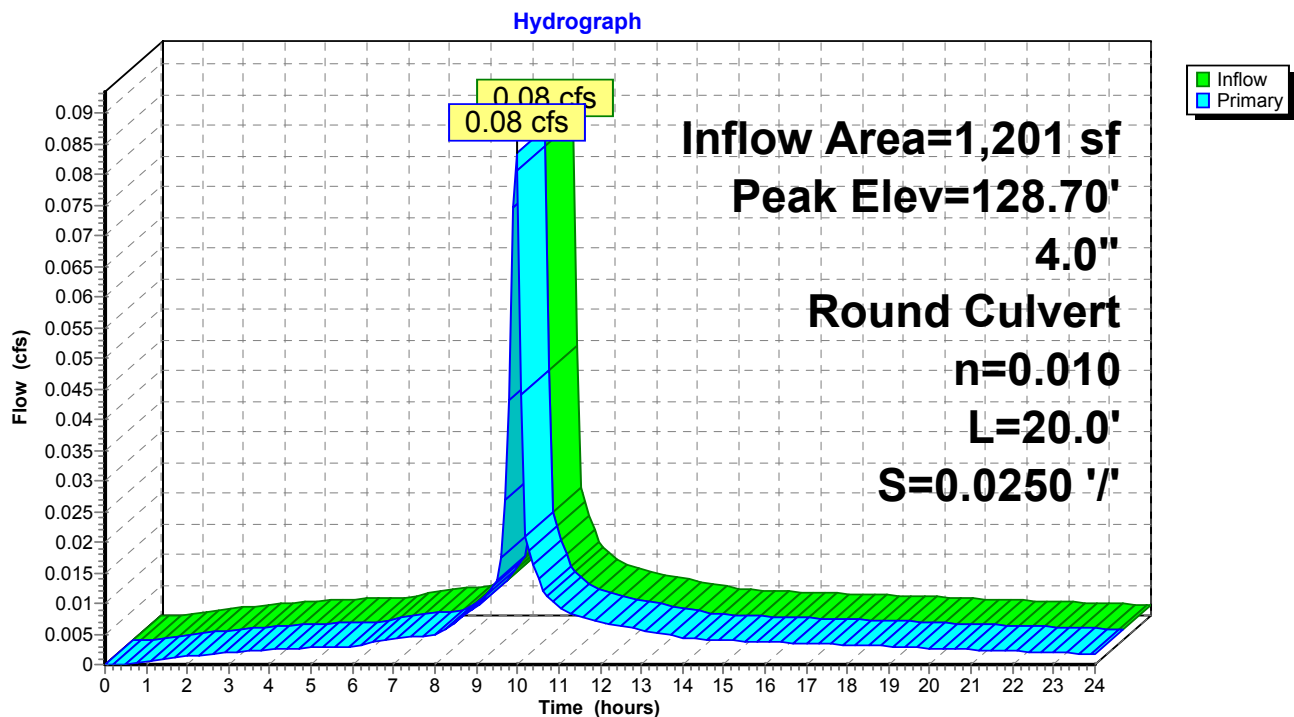
Inflow Area = 1,201 sf, 100.00% Impervious, Inflow Depth > 4.37" for 5-year Rainfall = 4.61" event
 Inflow = 0.08 cfs @ 9.96 hrs, Volume= 437 cf
 Outflow = 0.08 cfs @ 9.96 hrs, Volume= 437 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.08 cfs @ 9.96 hrs, Volume= 437 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 128.70' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	128.50'	4.0" Round Culvert L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.50' / 128.00' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.08 cfs @ 9.96 hrs HW=128.69' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.08 cfs @ 1.50 fps)

Pond 4P: Trench drain



Summary for Pond 10P: Pipe at End of Driveway

[57] Hint: Peaked at 124.38' (Flood elevation advised)

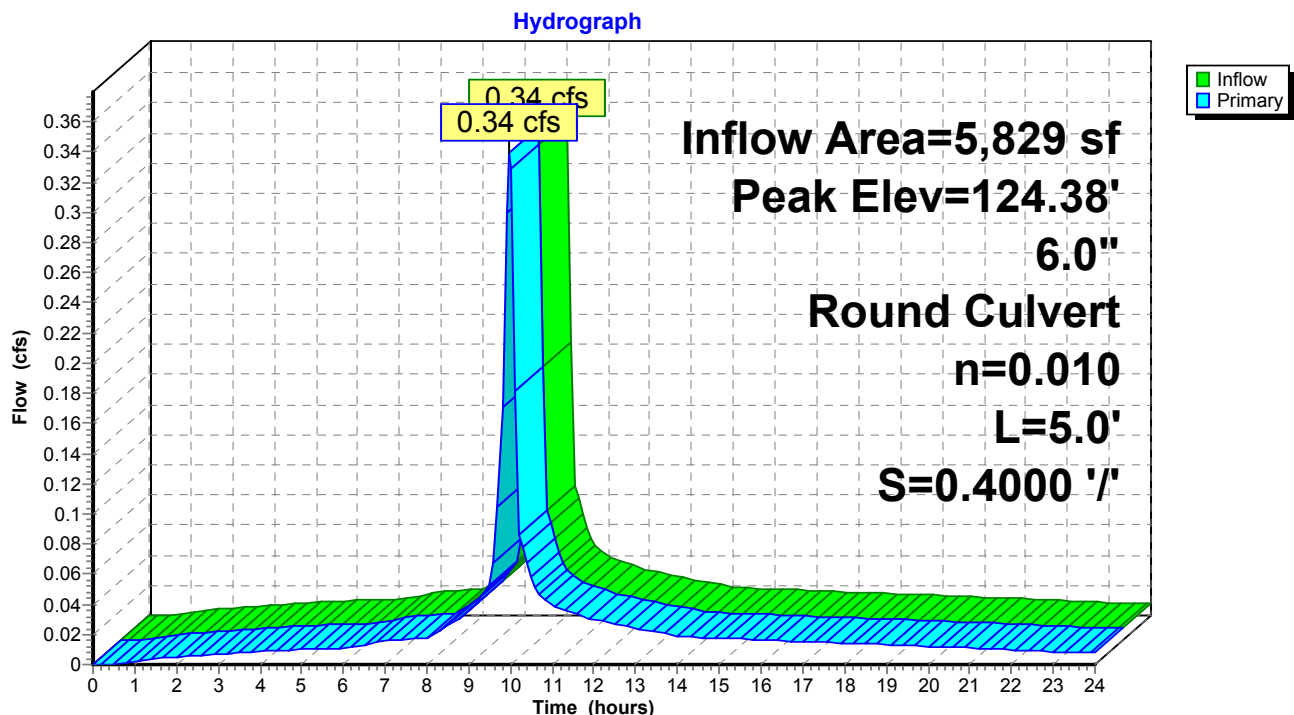
Inflow Area = 5,829 sf, 75.26% Impervious, Inflow Depth > 3.69" for 5-year Rainfall = 4.61" event
 Inflow = 0.34 cfs @ 9.97 hrs, Volume= 1,791 cf
 Outflow = 0.34 cfs @ 9.97 hrs, Volume= 1,791 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.34 cfs @ 9.97 hrs, Volume= 1,791 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 124.38' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	124.00'	6.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 124.00' / 122.00' S= 0.4000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.32 cfs @ 9.97 hrs HW=124.37' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.32 cfs @ 2.06 fps)

Pond 10P: Pipe at End of Driveway



1925 ECDLL_Post Construction Analysis Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment11S: Beach Area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>4.00"
Tc=0.0 min CN=83/98 Runoff=0.16 cfs 703 cf

Subcatchment12S: Bluff Area Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>0.81"
Tc=0.0 min CN=48/0 Runoff=0.01 cfs 111 cf

Subcatchment13S: Yards and Building Runoff Area=12,923 sf 0.00% Impervious Runoff Depth>2.28"
Tc=0.0 min CN=68/0 Runoff=0.52 cfs 2,456 cf

SubcatchmentSC-10: 1919 and 1921 Runoff Area=3,599 sf 59.93% Impervious Runoff Depth>4.09"
Flow Length=180' Slope=0.1250 '/' Tc=3.0 min CN=68/98 Runoff=0.23 cfs 1,228 cf

SubcatchmentSC-3: 1925 and 1927 ECDLL Runoff Area=1,029 sf 100.00% Impervious Runoff Depth>5.31"
Flow Length=100' Slope=0.0300 '/' Tc=3.0 min CN=0/98 Runoff=0.09 cfs 455 cf

SubcatchmentSC-4: Joint Existing Runoff Area=1,201 sf 100.00% Impervious Runoff Depth>5.31"
Flow Length=80' Slope=0.1200 '/' Tc=3.0 min CN=0/98 Runoff=0.10 cfs 531 cf

Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Peak Elev=135.20' Inflow=0.09 cfs 455 cf
4.0" Round Culvert n=0.010 L=85.0' S=0.0824 '/' Outflow=0.09 cfs 455 cf

Pond 4P: Trench drain Peak Elev=128.72' Inflow=0.10 cfs 531 cf
4.0" Round Culvert n=0.010 L=20.0' S=0.0250 '/' Outflow=0.10 cfs 531 cf

Pond 10P: Pipe at End of Driveway Peak Elev=124.44' Inflow=0.42 cfs 2,214 cf
6.0" Round Culvert n=0.010 L=5.0' S=0.4000 '/' Outflow=0.42 cfs 2,214 cf

Total Runoff Area = 22,520 sf Runoff Volume = 5,485 cf Average Runoff Depth = 2.92"
78.67% Pervious = 17,717 sf 21.33% Impervious = 4,803 sf

Summary for Subcatchment 11S: Beach Area

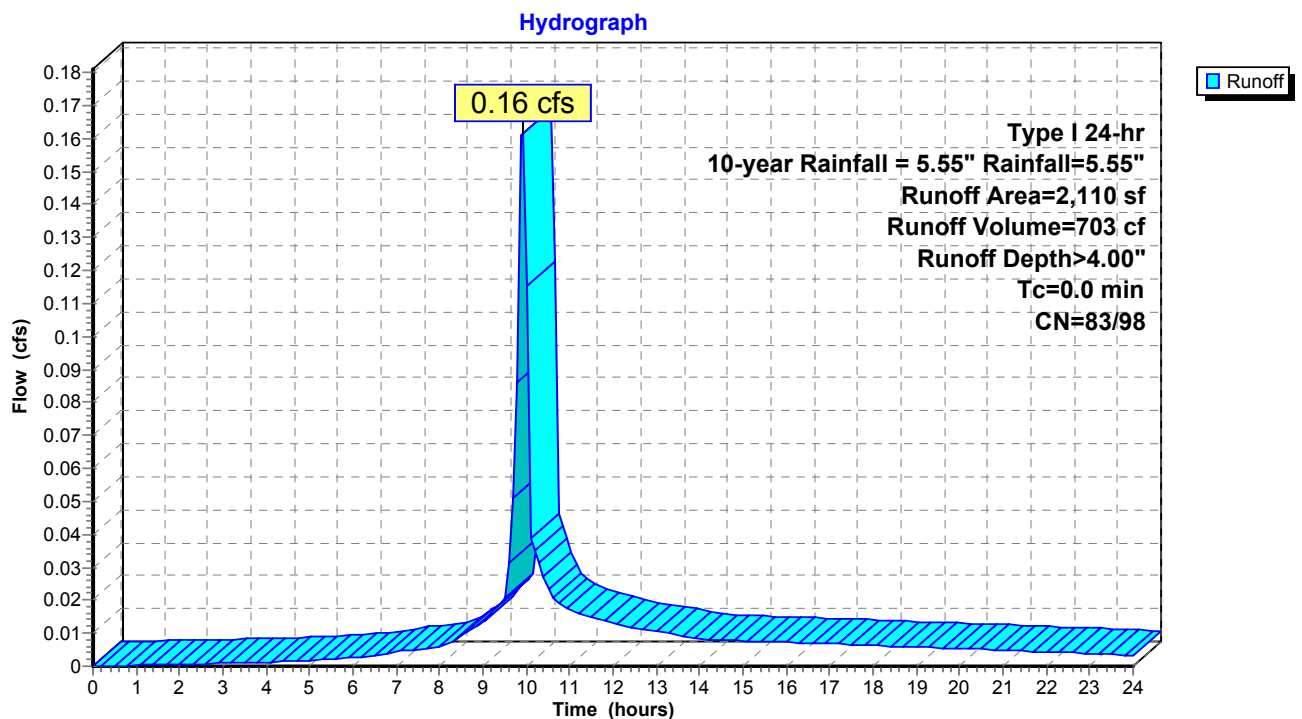
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.16 cfs @ 9.91 hrs, Volume= 703 cf, Depth> 4.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
416	98	Unconnected roofs, HSG D
1,694	83	Brush, Poor, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Subcatchment 11S: Beach Area



Summary for Subcatchment 12S: Bluff Area

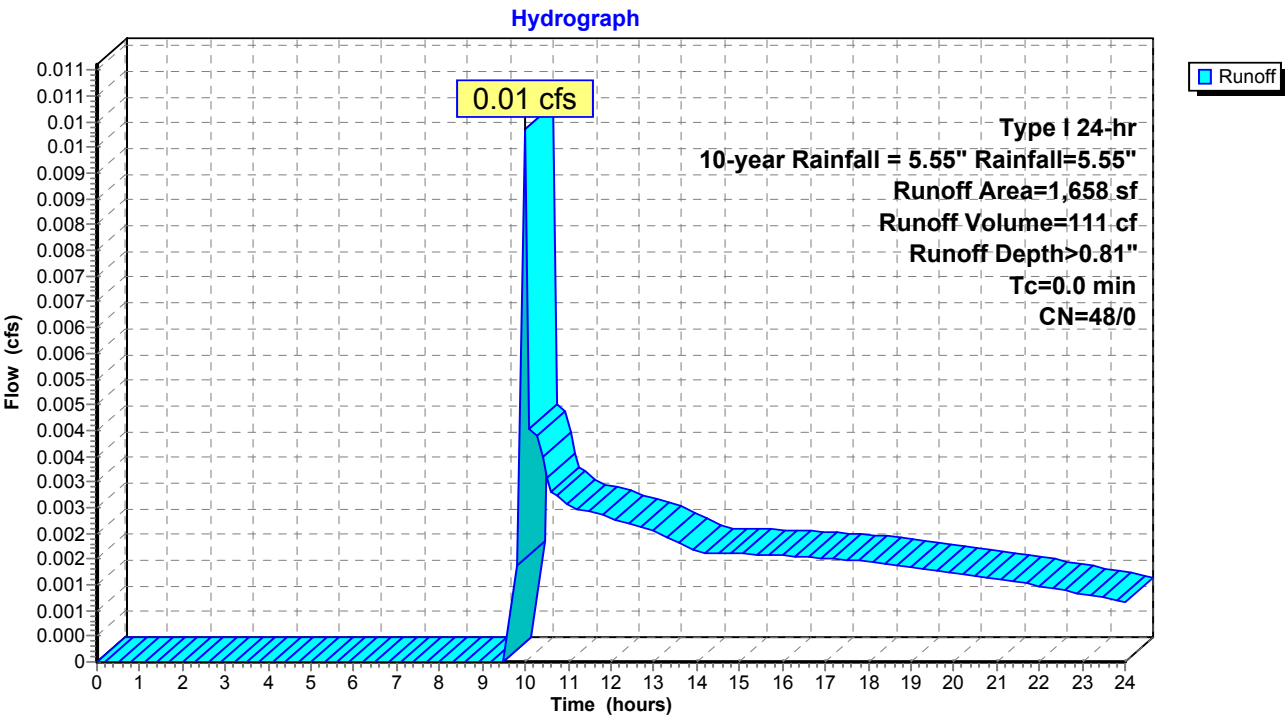
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.01 cfs @ 10.00 hrs, Volume= 111 cf, Depth> 0.81"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Subcatchment 12S: Bluff Area



Summary for Subcatchment 13S: Yards and Building Footprint

This Area is the sum of SC-PRE 2 through 6

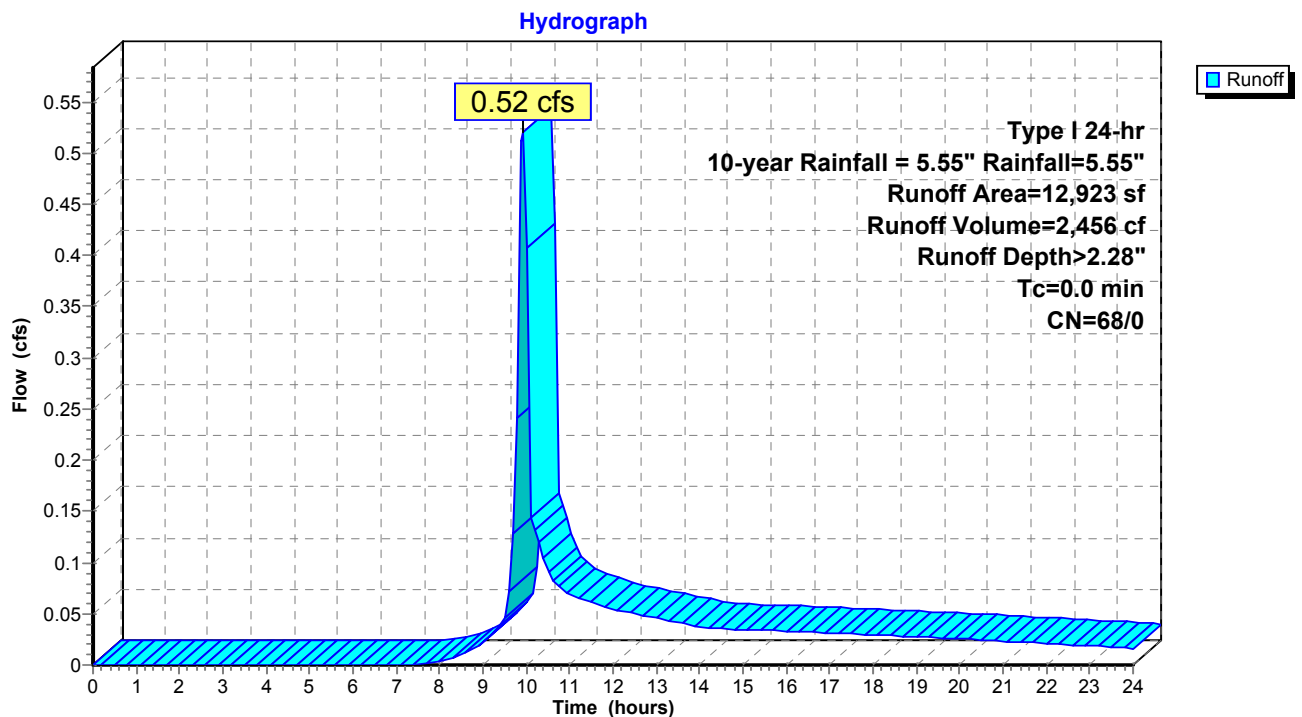
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.52 cfs @ 9.92 hrs, Volume= 2,456 cf, Depth> 2.28"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
12,923	68	<50% Grass cover, Poor, HSG A
12,923	68	100.00% Pervious Area

Subcatchment 13S: Yards and Building Footprint



Summary for Subcatchment SC-10: 1919 and 1921 Driveway and Adjacent Areas

[49] Hint: $T_c < 2dt$ may require smaller dt

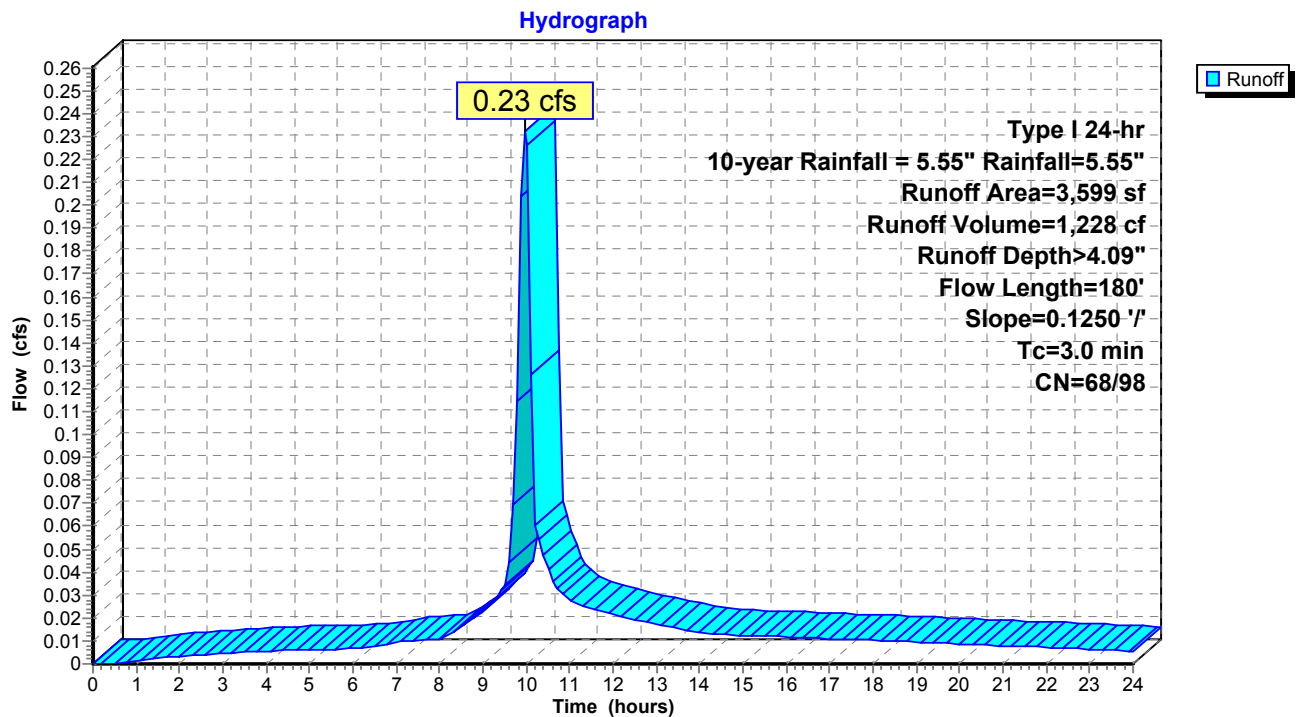
Runoff = 0.23 cfs @ 9.97 hrs, Volume= 1,228 cf, Depth> 4.09"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

	Area (sf)	CN	Description
*	2,157	98	Impervious
*	1,442	68	Pervious
	3,599	86	Weighted Average
	1,442	68	40.07% Pervious Area
	2,157	98	59.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	180	0.1250	3.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.9	180	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-10: 1919 and 1921 Driveway and Adjacent Areas



Summary for Subcatchment SC-3: 1925 and 1927 ECDLL Upper Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

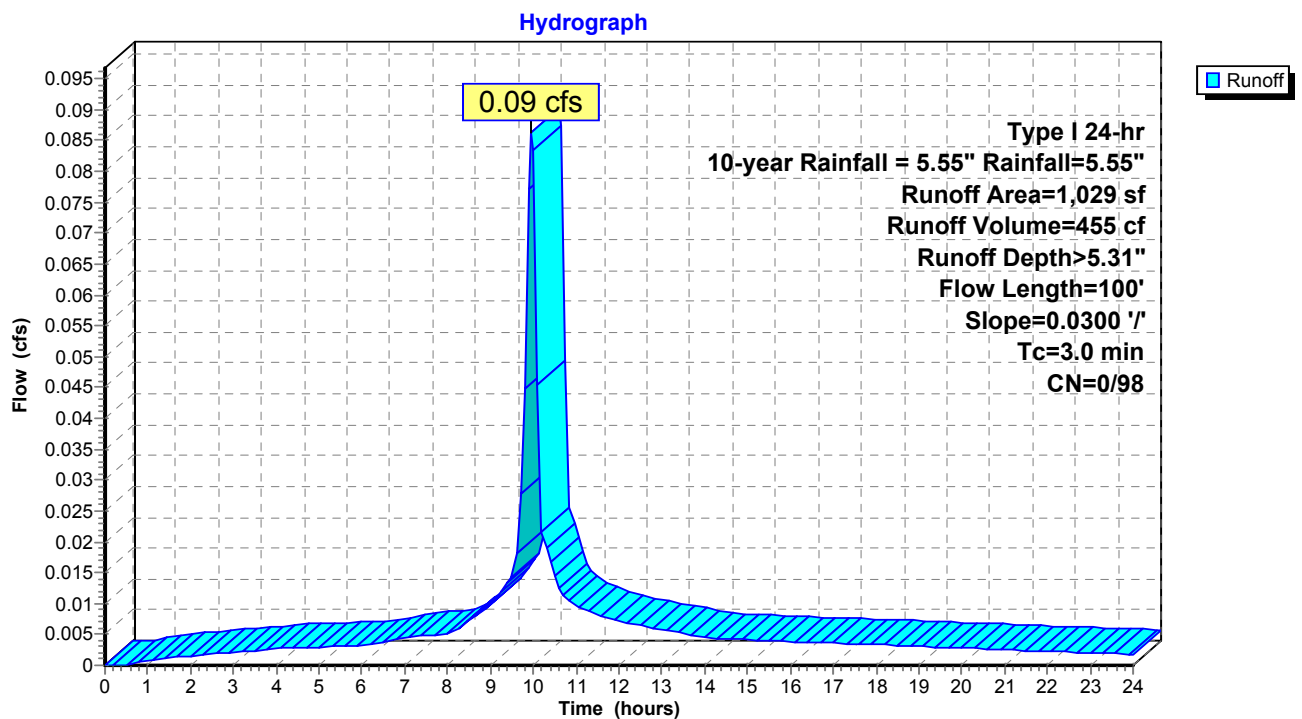
Runoff = 0.09 cfs @ 9.96 hrs, Volume= 455 cf, Depth> 5.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt = 0.10$ hrs
 Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
* 1,029	98	Impervious
1,029	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0300	1.26		Sheet Flow, n= 0.015 P2= 3.20"
1.3	100	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-3: 1925 and 1927 ECDLL Upper Driveway



Summary for Subcatchment SC-4: Joint Existing 1925-1927 ECDLL Driveway and 1927 ECDLL Garage Apron

[49] Hint: Tc<2dt may require smaller dt

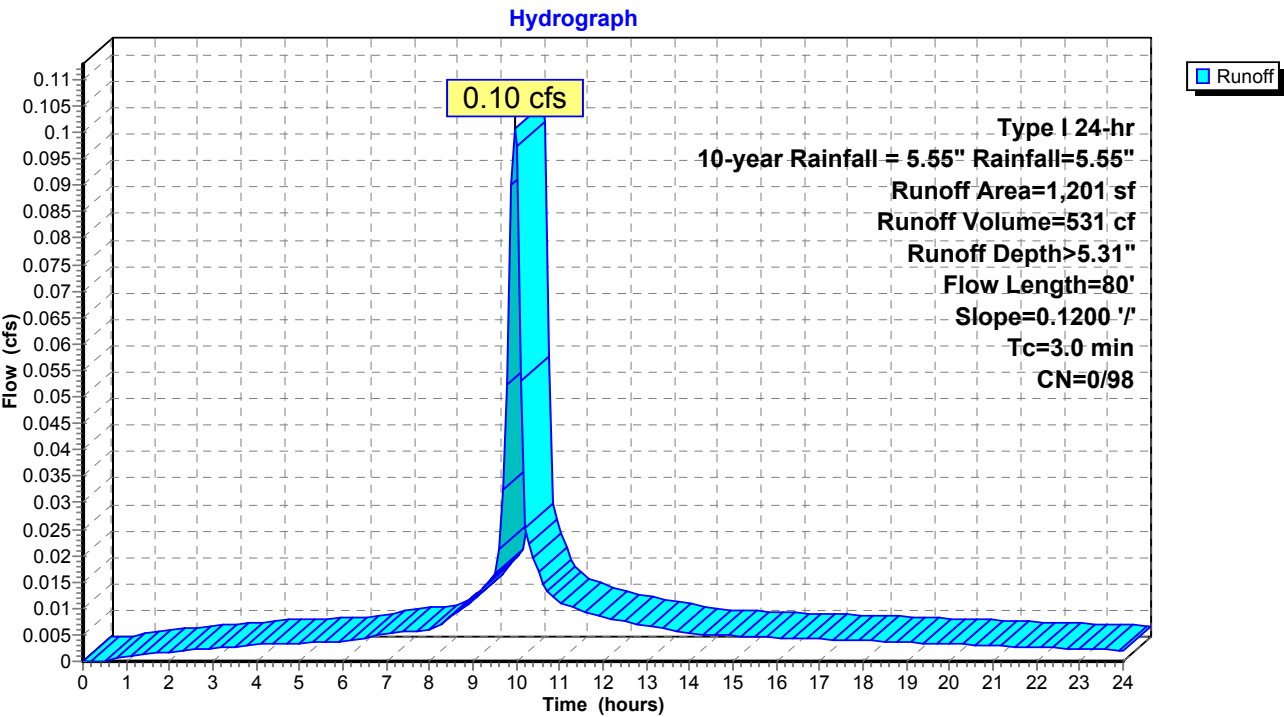
Runoff = 0.10 cfs @ 9.96 hrs, Volume= 531 cf, Depth> 5.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 10-year Rainfall = 5.55" Rainfall=5.55"

Area (sf)	CN	Description
* 1,201	98	Impervious
1,201	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	80	0.1200	2.10		Sheet Flow, n= 0.015 P2= 3.20"
0.6	80	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-4: Joint Existing 1925-1927 ECDLL Driveway and 1927 ECDLL Garage Apron



Summary for Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Area

[57] Hint: Peaked at 135.20' (Flood elevation advised)

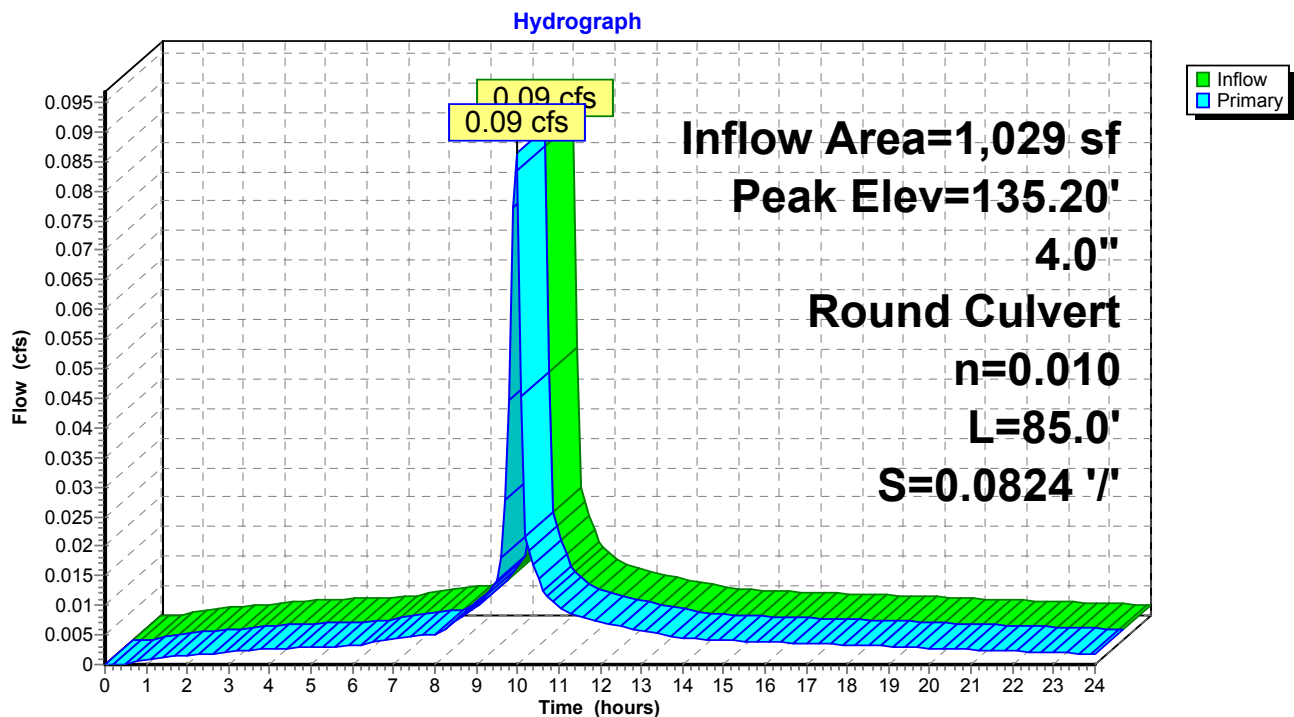
Inflow Area = 1,029 sf, 100.00% Impervious, Inflow Depth > 5.31" for 10-year Rainfall = 5.55" event
 Inflow = 0.09 cfs @ 9.96 hrs, Volume= 455 cf
 Outflow = 0.09 cfs @ 9.96 hrs, Volume= 455 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.09 cfs @ 9.96 hrs, Volume= 455 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 135.20' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	4.0" Round Culvert L= 85.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.00' / 128.00' S= 0.0824 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.08 cfs @ 9.96 hrs HW=135.20' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.08 cfs @ 1.51 fps)

Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Area



Summary for Pond 4P: Trench drain

[57] Hint: Peaked at 128.72' (Flood elevation advised)

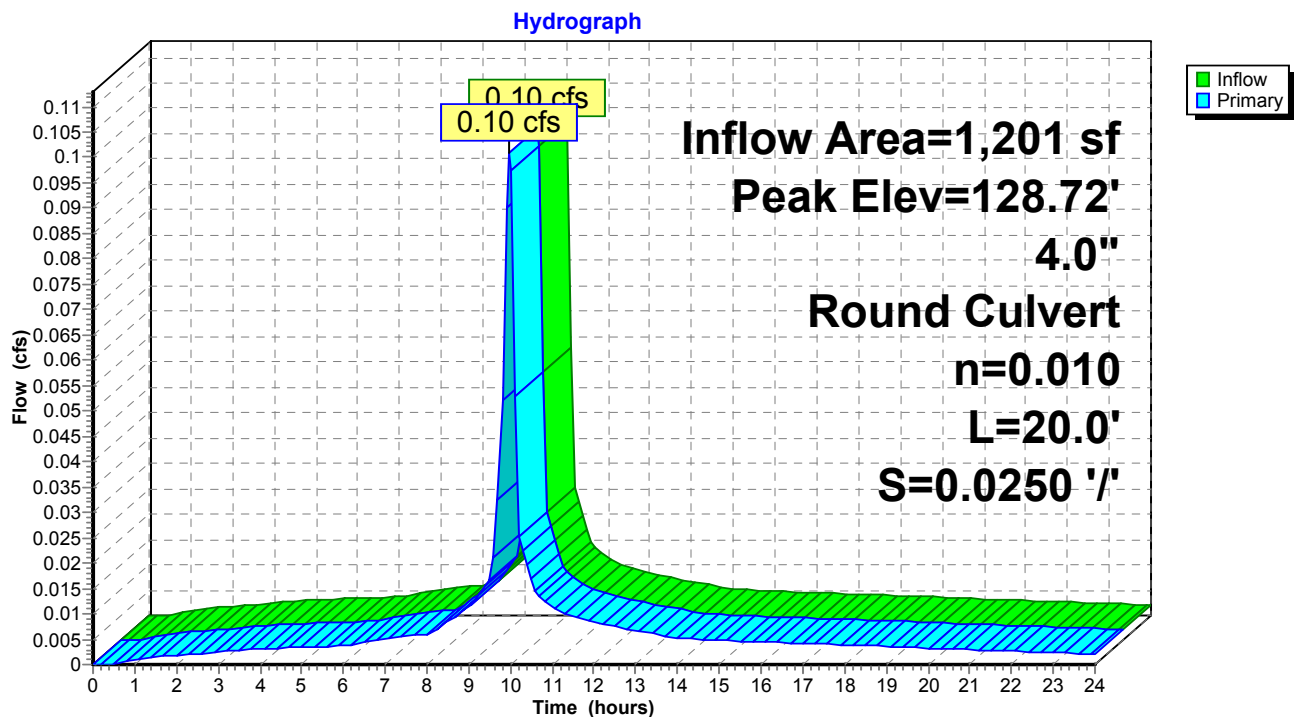
Inflow Area = 1,201 sf, 100.00% Impervious, Inflow Depth > 5.31" for 10-year Rainfall = 5.55" event
 Inflow = 0.10 cfs @ 9.96 hrs, Volume= 531 cf
 Outflow = 0.10 cfs @ 9.96 hrs, Volume= 531 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.10 cfs @ 9.96 hrs, Volume= 531 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 128.72' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	128.50'	4.0" Round Culvert L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.50' / 128.00' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.09 cfs @ 9.96 hrs HW=128.72' (Free Discharge)
 1=Culvert (Inlet Controls 0.09 cfs @ 1.58 fps)

Pond 4P: Trench drain



Summary for Pond 10P: Pipe at End of Driveway

[57] Hint: Peaked at 124.44' (Flood elevation advised)

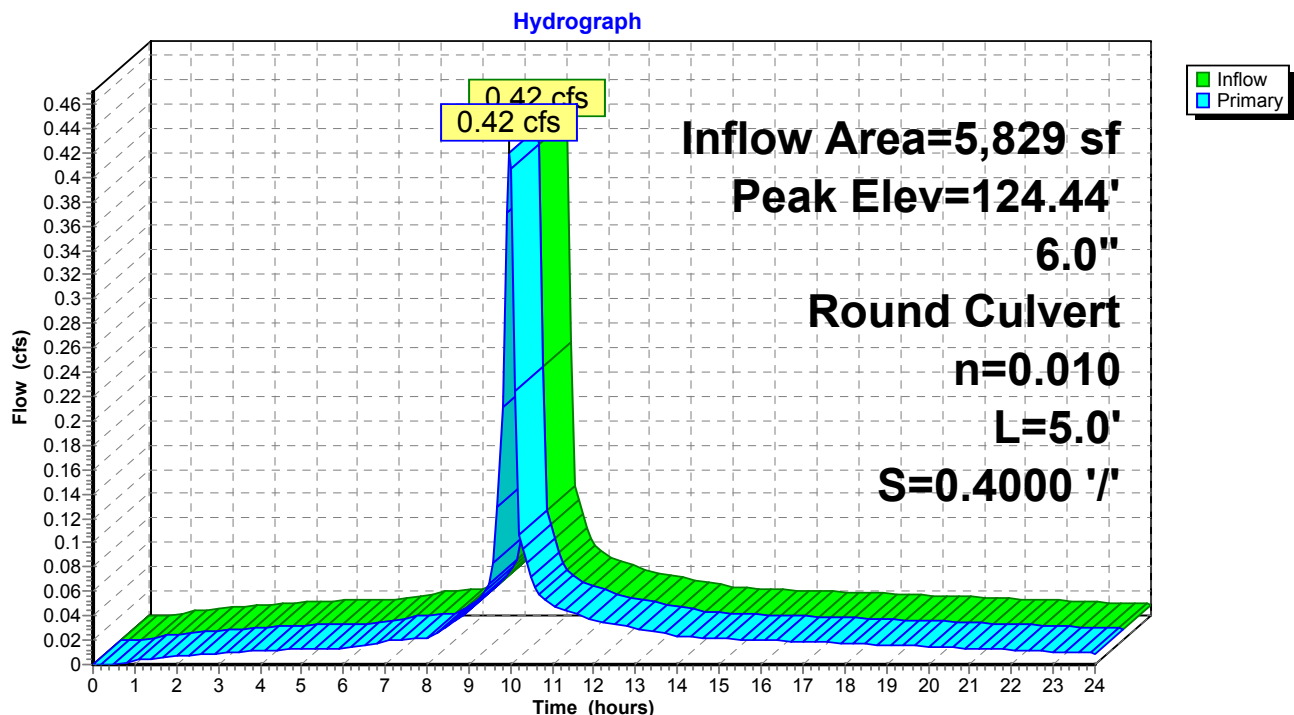
Inflow Area = 5,829 sf, 75.26% Impervious, Inflow Depth > 4.56" for 10-year Rainfall = 5.55" event
 Inflow = 0.42 cfs @ 9.97 hrs, Volume= 2,214 cf
 Outflow = 0.42 cfs @ 9.97 hrs, Volume= 2,214 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.42 cfs @ 9.97 hrs, Volume= 2,214 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 124.44' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	124.00'	6.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 124.00' / 122.00' S= 0.4000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.40 cfs @ 9.97 hrs HW=124.43' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.40 cfs @ 2.22 fps)

Pond 10P: Pipe at End of Driveway



1925 ECDLL_Post Construction Analysis Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment11S: Beach Area Runoff Area=2,110 sf 19.72% Impervious Runoff Depth>5.09"
Tc=0.0 min CN=83/98 Runoff=0.21 cfs 896 cf

Subcatchment12S: Bluff Area Runoff Area=1,658 sf 0.00% Impervious Runoff Depth>1.34"
Tc=0.0 min CN=48/0 Runoff=0.03 cfs 185 cf

Subcatchment13S: Yards and Building Runoff Area=12,923 sf 0.00% Impervious Runoff Depth>3.18"
Tc=0.0 min CN=68/0 Runoff=0.76 cfs 3,421 cf

SubcatchmentSC-10: 1919 and 1921 Runoff Area=3,599 sf 59.93% Impervious Runoff Depth>5.15"
Flow Length=180' Slope=0.1250 '/' Tc=3.0 min CN=68/98 Runoff=0.29 cfs 1,544 cf

SubcatchmentSC-3: 1925 and 1927 ECDLL Runoff Area=1,029 sf 100.00% Impervious Runoff Depth>6.47"
Flow Length=100' Slope=0.0300 '/' Tc=3.0 min CN=0/98 Runoff=0.10 cfs 555 cf

SubcatchmentSC-4: Joint Existing Runoff Area=1,201 sf 100.00% Impervious Runoff Depth>6.47"
Flow Length=80' Slope=0.1200 '/' Tc=3.0 min CN=0/98 Runoff=0.12 cfs 647 cf

Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Peak Elev=135.23' Inflow=0.10 cfs 555 cf
4.0" Round Culvert n=0.010 L=85.0' S=0.0824 '/' Outflow=0.10 cfs 555 cf

Pond 4P: Trench drain Peak Elev=128.75' Inflow=0.12 cfs 647 cf
4.0" Round Culvert n=0.010 L=20.0' S=0.0250 '/' Outflow=0.12 cfs 647 cf

Pond 10P: Pipe at End of Driveway Peak Elev=124.55' Inflow=0.52 cfs 2,746 cf
6.0" Round Culvert n=0.010 L=5.0' S=0.4000 '/' Outflow=0.52 cfs 2,746 cf

Total Runoff Area = 22,520 sf Runoff Volume = 7,248 cf Average Runoff Depth = 3.86"
78.67% Pervious = 17,717 sf 21.33% Impervious = 4,803 sf

Summary for Subcatchment 11S: Beach Area

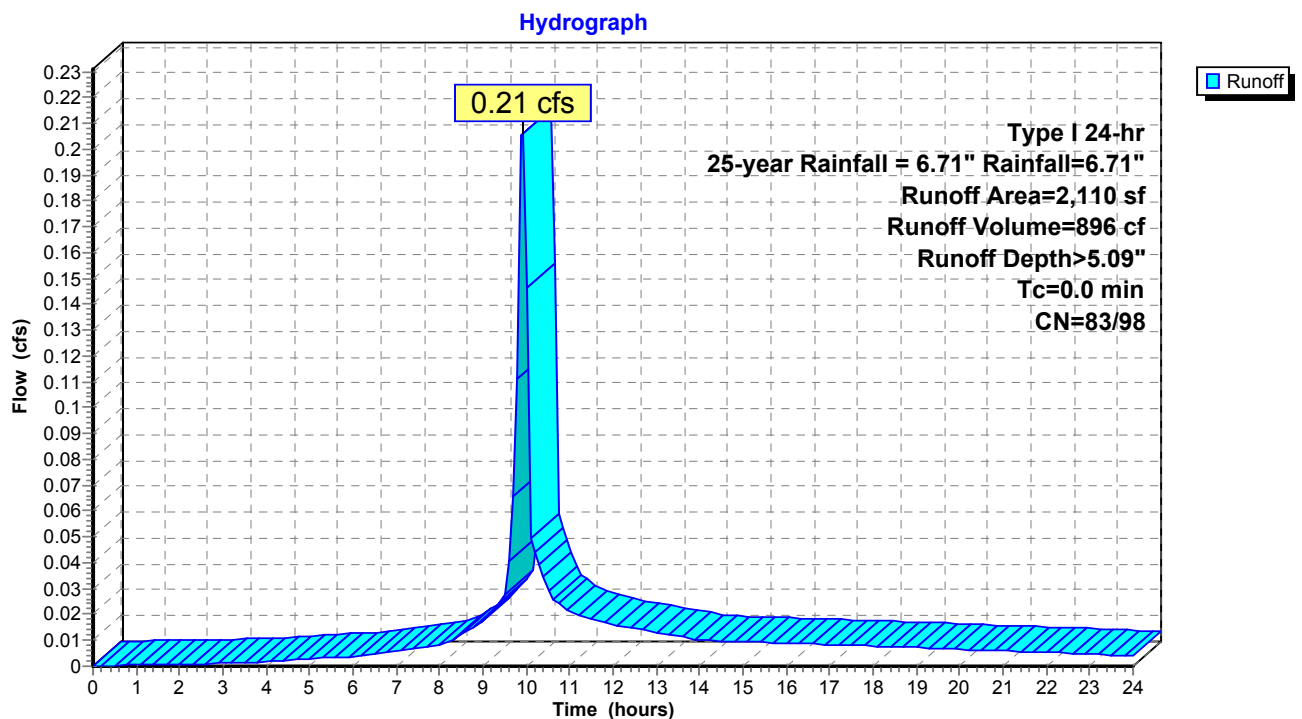
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.21 cfs @ 9.91 hrs, Volume= 896 cf, Depth> 5.09"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
416	98	Unconnected roofs, HSG D
1,694	83	Brush, Poor, HSG D
2,110	86	Weighted Average
1,694	83	80.28% Pervious Area
416	98	19.72% Impervious Area

Subcatchment 11S: Beach Area



Summary for Subcatchment 12S: Bluff Area

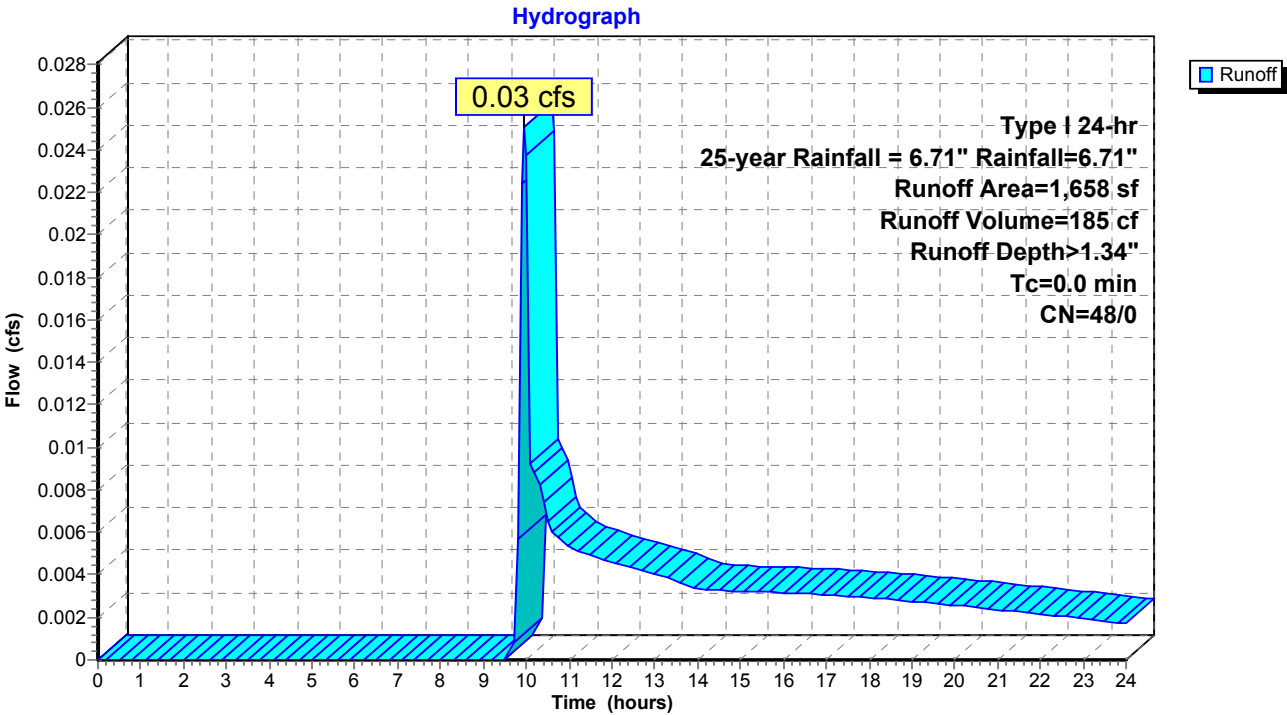
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.03 cfs @ 9.96 hrs, Volume= 185 cf, Depth> 1.34"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
1,658	48	Brush, Poor, HSG A
1,658	48	100.00% Pervious Area

Subcatchment 12S: Bluff Area



Summary for Subcatchment 13S: Yards and Building Footprint

This Area is the sum of SC-PRE 2 through 6

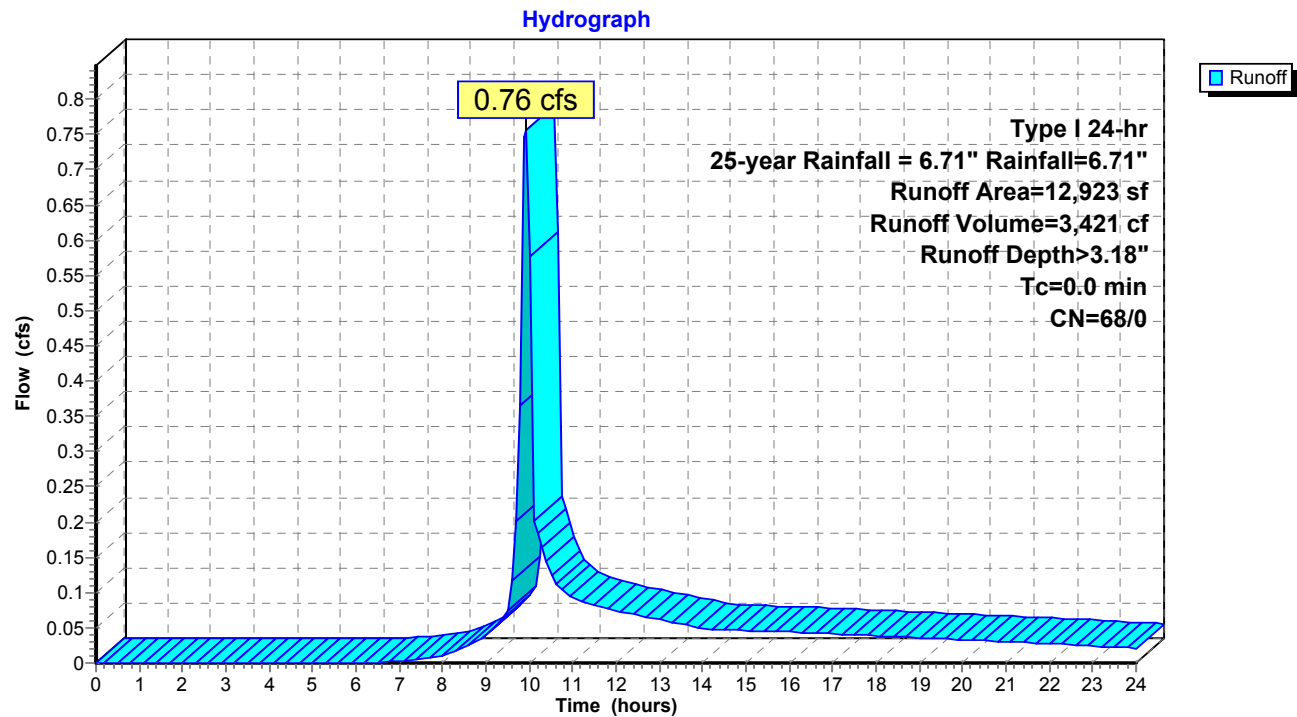
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.76 cfs @ 9.92 hrs, Volume= 3,421 cf, Depth> 3.18"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
12,923	68	<50% Grass cover, Poor, HSG A
12,923	68	100.00% Pervious Area

Subcatchment 13S: Yards and Building Footprint



Summary for Subcatchment SC-10: 1919 and 1921 Driveway and Adjacent Areas

[49] Hint: $T_c < 2dt$ may require smaller dt

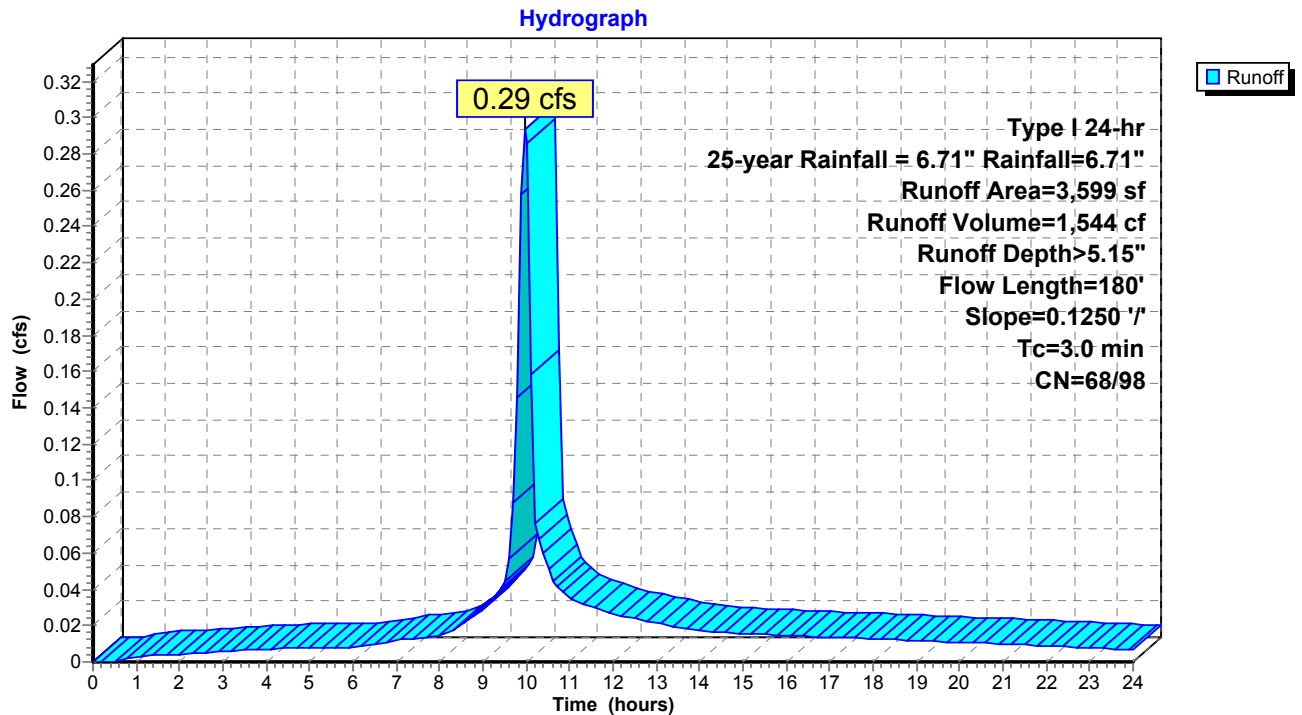
Runoff = 0.29 cfs @ 9.97 hrs, Volume= 1,544 cf, Depth> 5.15"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

	Area (sf)	CN	Description
*	2,157	98	Impervious
*	1,442	68	Pervious
	3,599	86	Weighted Average
	1,442	68	40.07% Pervious Area
	2,157	98	59.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	180	0.1250	3.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
0.9	180	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-10: 1919 and 1921 Driveway and Adjacent Areas



Summary for Subcatchment SC-3: 1925 and 1927 ECDLL Upper Driveway

[49] Hint: $T_c < 2dt$ may require smaller dt

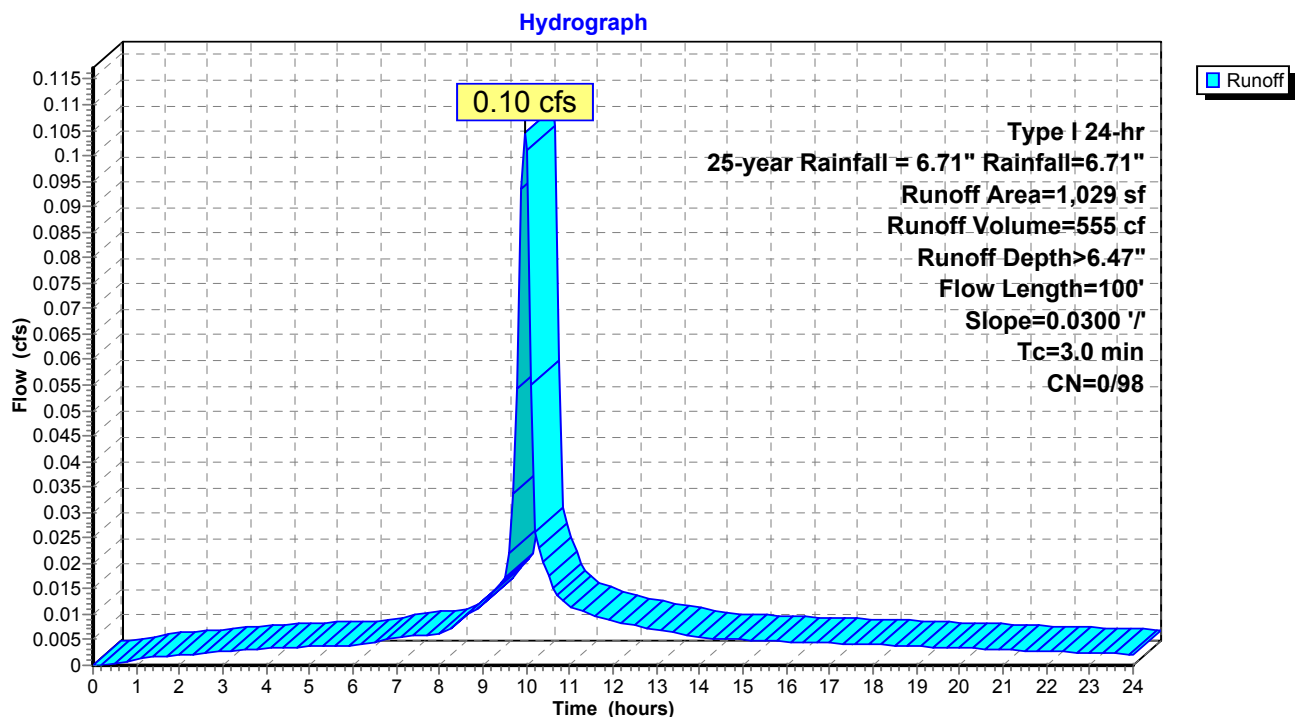
Runoff = 0.10 cfs @ 9.96 hrs, Volume= 555 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, $dt= 0.10$ hrs
 Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
* 1,029	98	Impervious
1,029	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0300	1.26		Sheet Flow, n= 0.015 P2= 3.20"
1.3	100	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-3: 1925 and 1927 ECDLL Upper Driveway



Summary for Subcatchment SC-4: Joint Existing 1925-1927 ECDLL Driveway and 1927 ECDLL Garage Apron

[49] Hint: Tc<2dt may require smaller dt

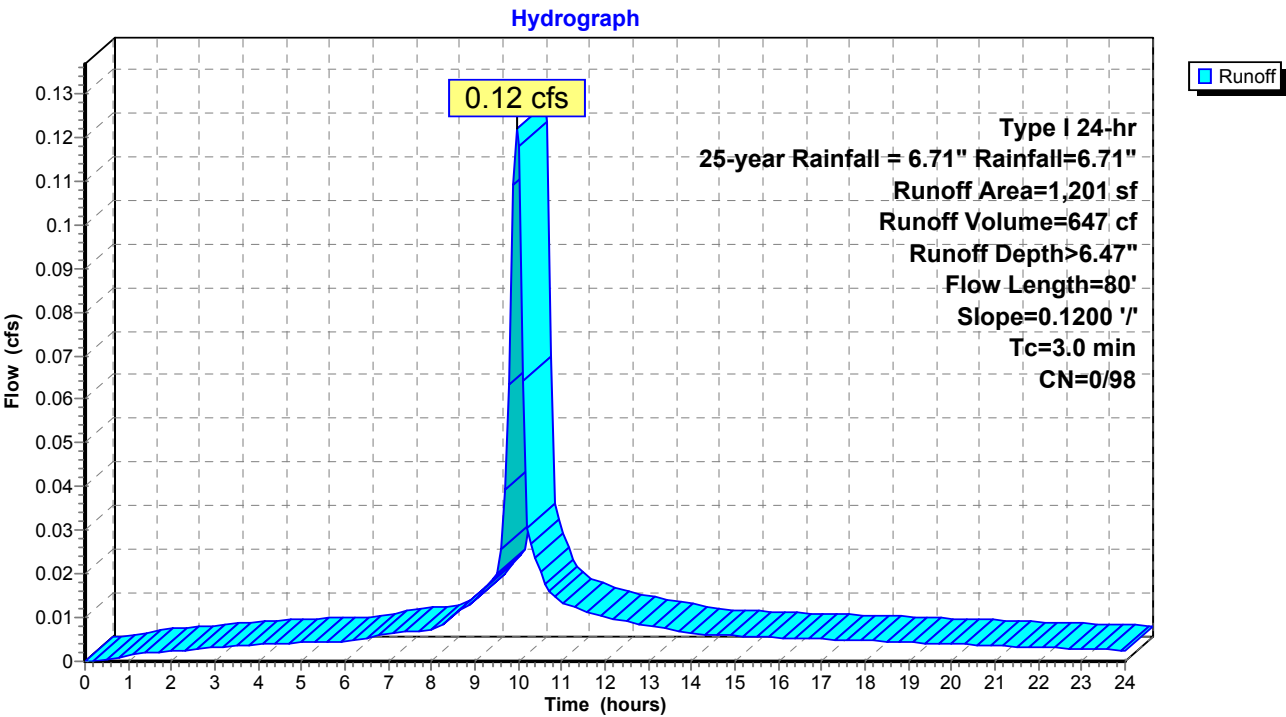
Runoff = 0.12 cfs @ 9.96 hrs, Volume= 647 cf, Depth> 6.47"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Type I 24-hr 25-year Rainfall = 6.71" Rainfall=6.71"

Area (sf)	CN	Description
* 1,201	98	Impervious
1,201	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	80	0.1200	2.10		Sheet Flow, n= 0.015 P2= 3.20"
0.6	80	Total, Increased to minimum Tc = 3.0 min			

Subcatchment SC-4: Joint Existing 1925-1927 ECDLL Driveway and 1927 ECDLL Garage Apron



Summary for Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Area

[57] Hint: Peaked at 135.23' (Flood elevation advised)

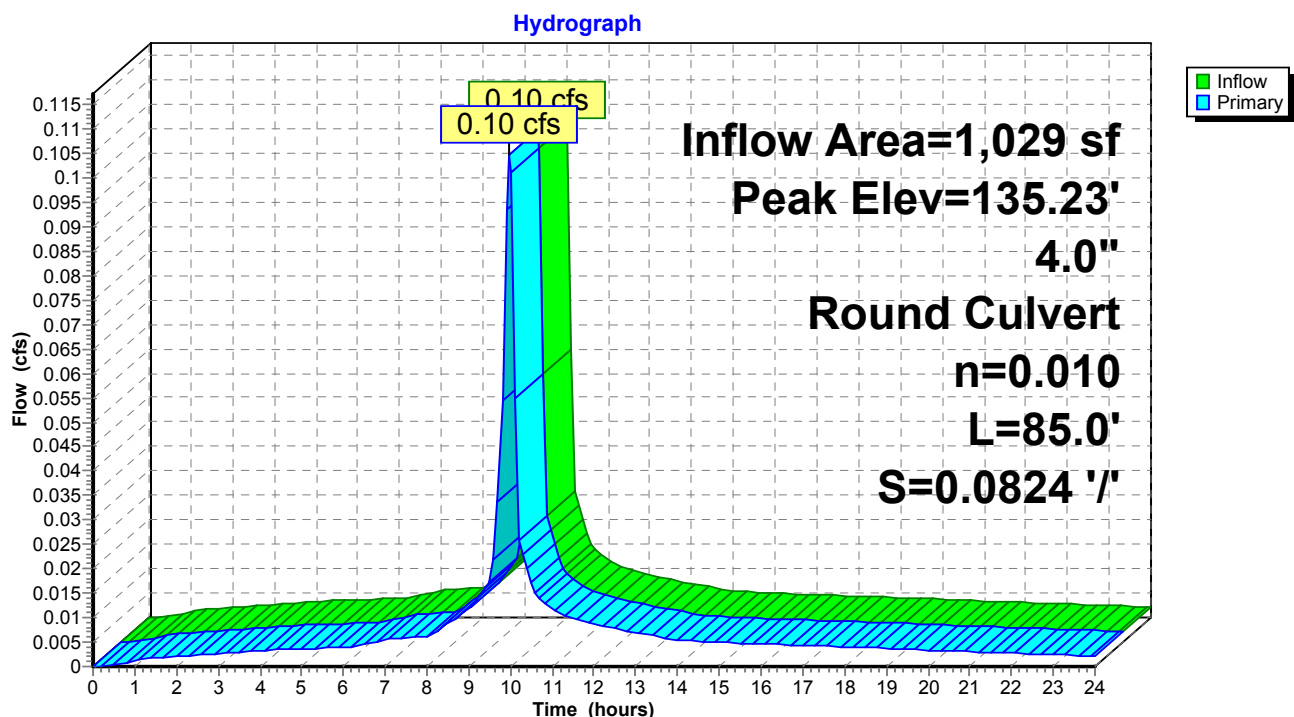
Inflow Area = 1,029 sf, 100.00% Impervious, Inflow Depth > 6.47" for 25-year Rainfall = 6.71" event
 Inflow = 0.10 cfs @ 9.96 hrs, Volume= 555 cf
 Outflow = 0.10 cfs @ 9.96 hrs, Volume= 555 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.10 cfs @ 9.96 hrs, Volume= 555 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 135.23' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	4.0" Round Culvert L= 85.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.00' / 128.00' S= 0.0824 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.10 cfs @ 9.96 hrs HW=135.22' (Free Discharge)
 1=Culvert (Inlet Controls 0.10 cfs @ 1.60 fps)

Pond 3P: 1925 and 1927 ECDLL Upper Driveways and Planter Area



Summary for Pond 4P: Trench drain

[57] Hint: Peaked at 128.75' (Flood elevation advised)

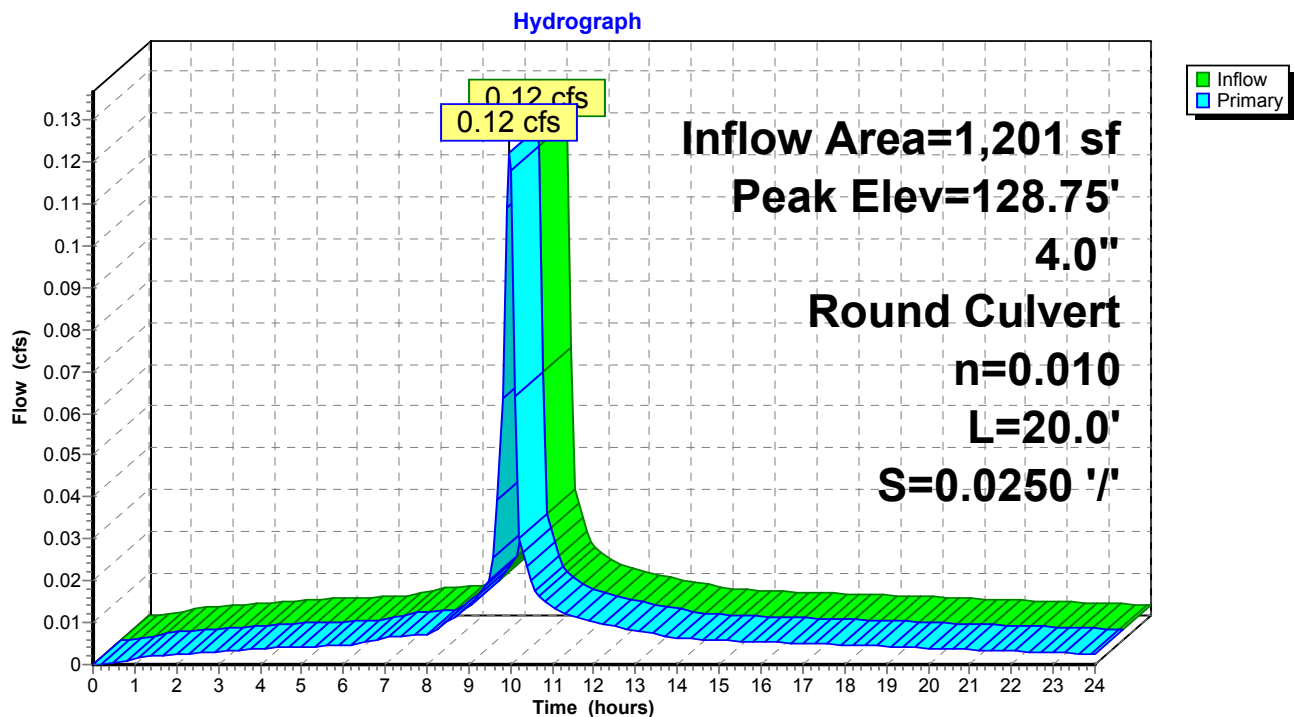
Inflow Area = 1,201 sf, 100.00% Impervious, Inflow Depth > 6.47" for 25-year Rainfall = 6.71" event
 Inflow = 0.12 cfs @ 9.96 hrs, Volume= 647 cf
 Outflow = 0.12 cfs @ 9.96 hrs, Volume= 647 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.12 cfs @ 9.96 hrs, Volume= 647 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 128.75' @ 9.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	128.50'	4.0" Round Culvert L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.50' / 128.00' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.11 cfs @ 9.96 hrs HW=128.74' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.11 cfs @ 1.68 fps)

Pond 4P: Trench drain



Summary for Pond 10P: Pipe at End of Driveway

[57] Hint: Peaked at 124.55' (Flood elevation advised)

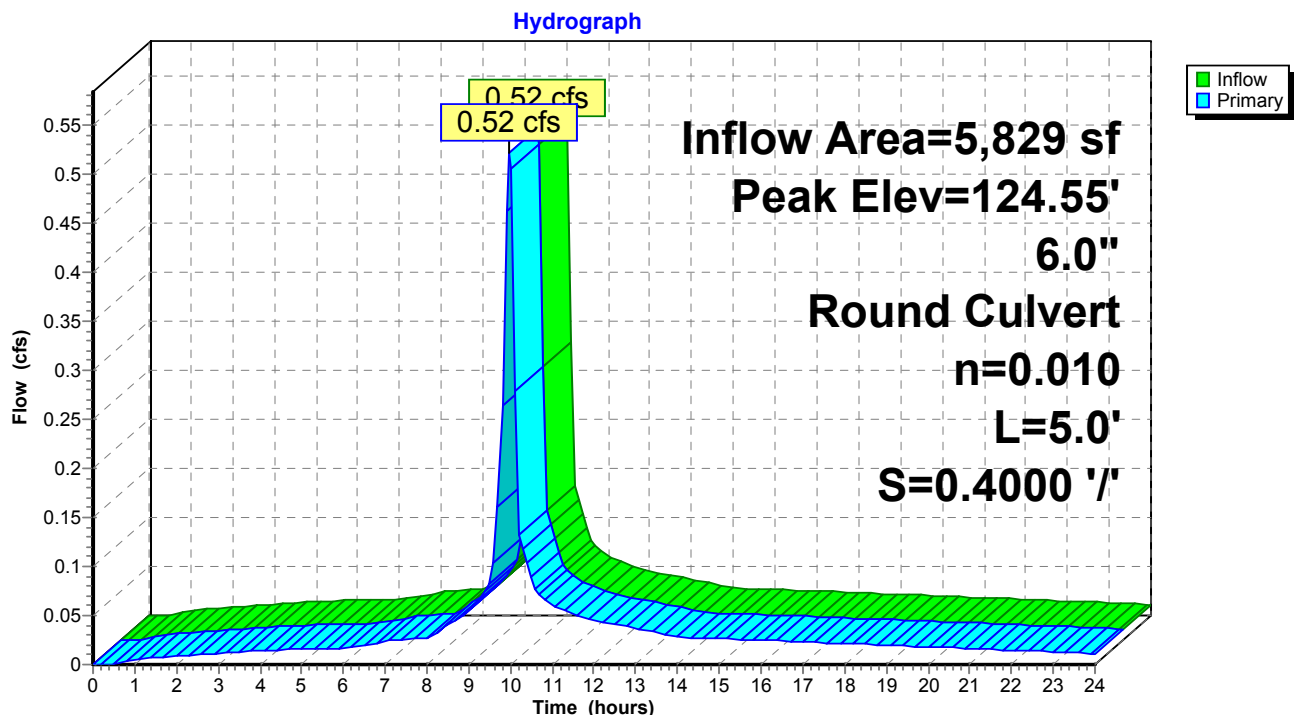
Inflow Area = 5,829 sf, 75.26% Impervious, Inflow Depth > 5.65" for 25-year Rainfall = 6.71" event
 Inflow = 0.52 cfs @ 9.97 hrs, Volume= 2,746 cf
 Outflow = 0.52 cfs @ 9.97 hrs, Volume= 2,746 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.52 cfs @ 9.97 hrs, Volume= 2,746 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
 Peak Elev= 124.55' @ 9.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	124.00'	6.0" Round Culvert L= 5.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 124.00' / 122.00' S= 0.4000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.49 cfs @ 9.97 hrs HW=124.52' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.49 cfs @ 2.49 fps)

Pond 10P: Pipe at End of Driveway



APPENDIX H

SWMS Maintenance, Monitoring/Reporting and Adaptive Management

In this Appendix, we summarize our recommendations for maintenance, monitoring reporting and adaptive management of the proposed Storm Water Management System (SWMS) at 1925 El Camino De La Luz (ECDLL), Santa Barbara during the regulatory 75-year economic life of the proposed residential reuse project. In these recommendations, in relevant parts, we incorporate the typical “special conditions” of Coastal Development Permit (CDP) approval by the California Coastal Commission for projects such as the one proposed for residential reuse at the parcel. As integral components of the SWMS to assure its continued proper functionality, the provisions below should be (1) included, as applicable, in notes on the project architectural, grading, and drainage/erosion control plans, (2) posted, or otherwise kept, in a permanent copy in the equipment/utility room of the replacement house, and (3) be recorded (e.g., as part of the approved/issued CDP for the residential reuse project) as an exception to title of parcel during said duration. We recommend that CSA be contacted immediately should there be any questions, issues, or problems relating to the implementation of the SWMS.

(a) Generally.

All SWMS BMPs set forth in this Hydrology Report shall be operated, monitored, and maintained in accordance with manufacturer’s specifications, as applicable, or in accordance with standard technical specifications appropriate to the BMP for the life of the project. At a minimum, all structural BMPs shall be inspected, cleaned-out, and where necessary, repaired prior to November 1 (the annual onset of the storm season) and at regular intervals as necessary between November 1 and April 15 of each year. The effectiveness and efficiency of the Project Storm Water Management Protocol (Appendix H) shall be reviewed by the permittee (or any heir, successor, or assign of the parcel) at (1) the end of the first rain year (September 1 - August 31) following issuance of the project Occupancy Permit, (2) after the first 25-year recurrence, 24hr, 6.71 storm event, (3) after any 100-year recurrence, 24hr, 7.24-inch or greater storm event, and (4) otherwise at five (5) year intervals. Proposed adaptive management of structural or operational BMPs shall be reviewed by the project hydrologist and civil engineer, and be submitted to the City Community Development Department and Public Works Department for review and approval, as applicable.

(b) Recommended Additional Maintenance BMP’s.

We recommend that the project civil engineer include notes on the project drainage plan(s) for the following BMP maintenance:

(1) General Schedule for all structural BMP inspection, performance of maintenance (e.g., October 15 of each year).

(2) General Schedule for all operational BMP performance ((e.g., October 15 of each year).

(3) Specific Schedule for structural BMP inspection following (a) rain storms that exceed 6.71 inches in 24 hours, (b) cumulative precipitation that exceeds 26 inches [140% of the current (2015) long-term average at the reference measurement station] during a Rain Year (after September 1 and before August 31), and/or (3) any seismic event at Santa Barbara or within 50 miles of the project site greater than M5.0.

(4) Specific Schedule for planter, private open space, and side yard maintenance, to avoid (reduce) the potential, as applicable, for leakage, cracking, deformation, and for non-chemical control of successional non-native invasive species that may occur in SC-5, 11, 12, 13, 14, 15, and/or 17.

(5) Specific schedule for clean-out maintenance (including sediment and debris removal) of DI's 3, 5, 6, 11, 12, 13, 14, and 15, TD's 4, 7, and 8, WST's 1, 2, and 3, the SC-3 and SC-18 outfalls, and cobble lined flow lines in SC-11, 12, 17, and 18.

(6) Specific schedule for WST 1, 2 and 3 water quality testing and UVL treatment system maintenance.

(7) Specific schedule for WST-1, 2, and 3 backup power source inspection and maintenance.

(8) Debris and other storm water pollutants removed from structural BMP(s) during clean-out shall be contained and disposed of consistent with applicable standards in City Municipal Code chapter 7.16, Garbage and Refuse Collection and Disposal.

(c) Recommended Additional Monitoring/Reporting BMP's.

(1) To comply with the City's Storm Water Phase II General Permit issued and regulated by the State/Regional Water Resources Control Board, and to maintain or improve water quality, as applicable, the project civil engineer (or architect) shall verify in writing, addressed to the City Division of Building and Safety, and subject to approval by the project building inspector (or other applicable public development regulatory agency official) that all post-project construction completion BMP's recommended by CSA, or required by the City or by any other development regulatory agency with jurisdiction over the project, (a) have been installed as recommended/approved, and (b) that on that basis the project complies with the City's

Tier 3 storm water requirements as they are set forth in the current (2013) adopted City Storm Water Guidance Manual, or other subsequently specified adopted and effective regulatory agency standard. CSA requests that the verifying project civil engineer or architect provide CSA with an electronic copy of said written document for review at least five (5) working days prior to its submittal to the City's Building and Safety Division.

(2) Piezometer (at SD-2) monitoring schedule, as follows: (a) within 30 days after any rain storm that exceeds 6.71 inches in 24 hours, and (b) cumulative precipitation that exceeds 26 inches [140% of the current (2015) long-term average at the reference measurement station] during a Rain Year (after September 1 and before August 31).

(3) Feedback from and coordination by the project biologist, WRA, regarding biological monitoring of contiguous lemonade berry stand (SC-19), horticultural lemonade berry mitigation area (SC-18), side yard and private open space and side yard native vegetation plantings (SCs 5, 6, 11, 12, and 17), and vegetated planter elements (SCs 13, 14, 15), according to the monitoring schedule recommended by WRA, but not less than (a) prior to October 15 of the year following issuance of the project occupancy permit, (b) prior to October 15 of the 5th year following issuance of the project occupancy permit, and (c) thereafter prior to October 15 of the 10th, 25th, 50th, and 75th year following issuance of the project occupancy permit.

(d) Recommended Review/Consideration of Potential Adaptive Management BMPs.

CSA recommends that the CDP permittee, in consultation with CSA and such other project team members as relevant, review and consider potential adaptive SWMS management BMPs according to the following schedule:

(1) On or before October 15 in the year following issuance of the project occupancy permit.

(2) After any rain event, as measured at the reference station, greater than 6.71 inches in 24 hours (the City maximum design rainfall event).

(3) After any piezometer reading that indicates the presence of groundwater at SD-2 within 10 feet of the ground surface.

(4) After any rain event, as measured at the reference station, greater than 7.24 inches in 24 hours (the County 100-year rainfall event).

(5) After any rain event, as measured at the reference station, greater than 9.52 inches in 24 hours (the County 1,000-year rainfall event).

(6) Prior to any change in legal ownership of the parcel.

(7) In the event of non-performance (failure), for any reason, of any recommended surface or subsurface drainage, filtration, retention, or other storm water management BMP, or in the event of substantial erosion (>10 cy) in any sub-catchment, the Emprise Trust or any heir, successor, or assign shall (a) inform CSA within 24 hours of the event, and (b) perform necessary repairs to the affected drainage, filtration, tank, pump, affected area, or other BMP(s) consistent with applicable City review and entitlements requirements.

(e) Reporting

CSA recommends that all monitoring performed pursuant to this Hydrology Report be reported within five (5) business days by the Emprise Trust, or its agent (or any heir, successor, or assign of the parcel, or their agent) in electronic form (email) to the City Community Development Department, Public Works Department, CSA, and other project team members, as applicable.